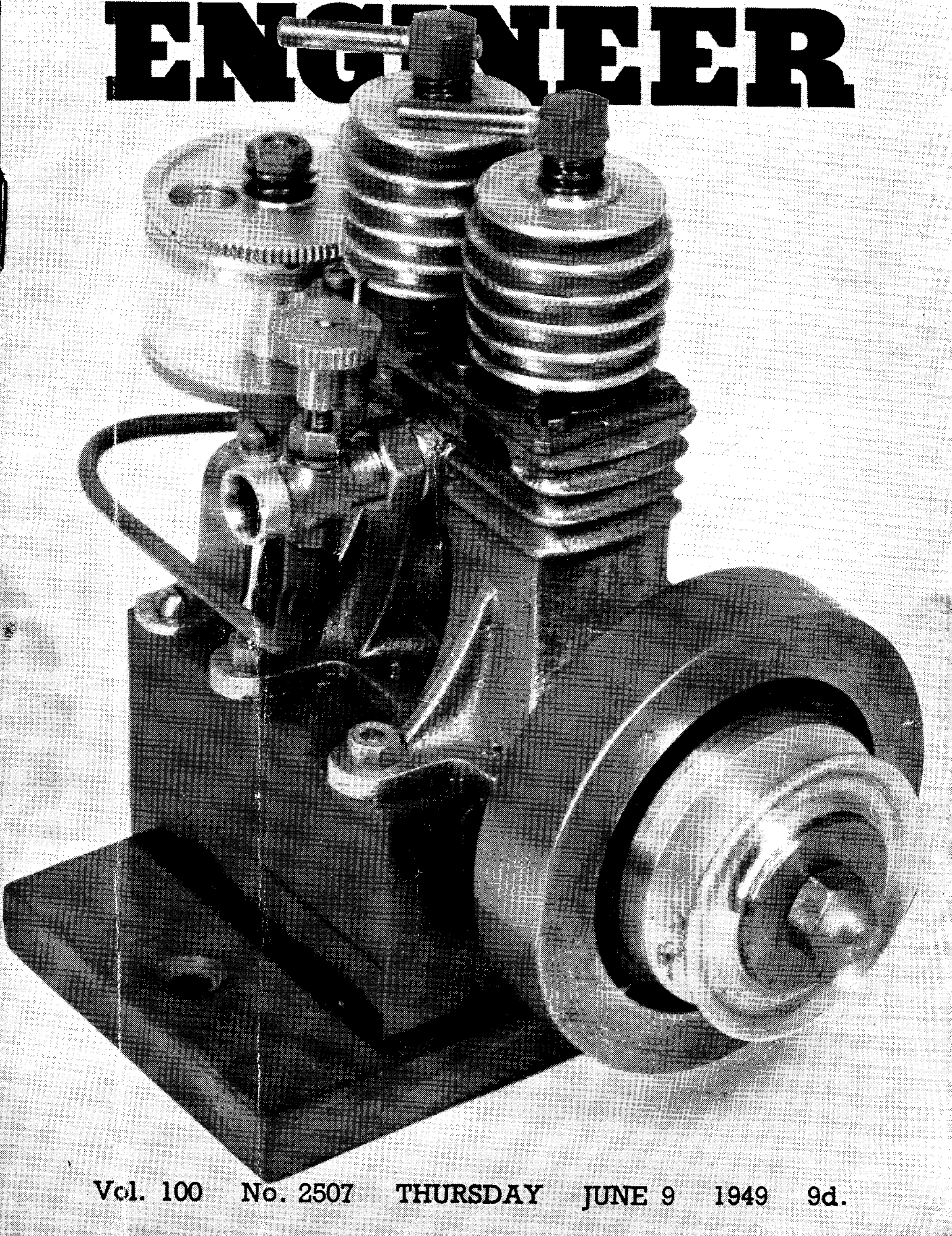
THE MODEL ENGINEER



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The MODEL ENGINEER

PERCIVAL MARSHALL & CO. LTD., 23, GREAT QUEEN ST., LONDON, W.C.2

9TH JUNE 1949 VOL. 100 NO. 2507

SMOKE RINGS

Model Traction Engines at Work

● WE ARE glad to announce that at THE MODEL ENGINEER Exhibition this year, model traction engines will definitely be seen *at work.* So far as THE MODEL ENGINEER Exhibition is concerned, this will be a decided novelty, for we believe that owing to stringent L.C.C. regulations, among other things, we have never been allowed to run such models. However, many rules and regulations have to be revised occasionally, to keep pace with the march of progress ! And so it has come about that model traction engines will be seen, we believe for the first time in London, showing off their capabilities in public. And we are inclined to think that the public will be surprised to note the apparently prodigious power of these steam-driven units, which has to be seen to be believed.

The miniature railway locomotive, now so frequently performing in public in almost every town in the country, never fails to arouse astonished interest ; and there is every reason to expect the miniature traction engine to do the same.

An Insurance Suggestion

● AS A result of the recent article " Legal Liability and Passenger Tracks," we received some enquiries as to whether we would be prepared to initiate a scheme whereby any societies owning passenger-carrying tracks could have the benefit of insurance by paying a small annual contribution to us. In other words, it was suggested that we should take out a policy to cover all clubs and societies who, in turn, would pay a share of the cost.

We liked this idea and we have discussed the possibilities with a firm of insurance brokers. We are pleased to find that the idea is possible, provided that the number of interested clubs is sufficient to justify the scheme being put into effect. Obviously, the more there are, the less would be the annual sum for each to pay.

May we suggest, therefore, that the executives of track-owning clubs give the matter some consideration and advise us, as soon as possible, if they are willing to participate in the scheme ? When we can estimate the number of interested clubs, we shall be in a position to make a closer assessment of the costs involved.

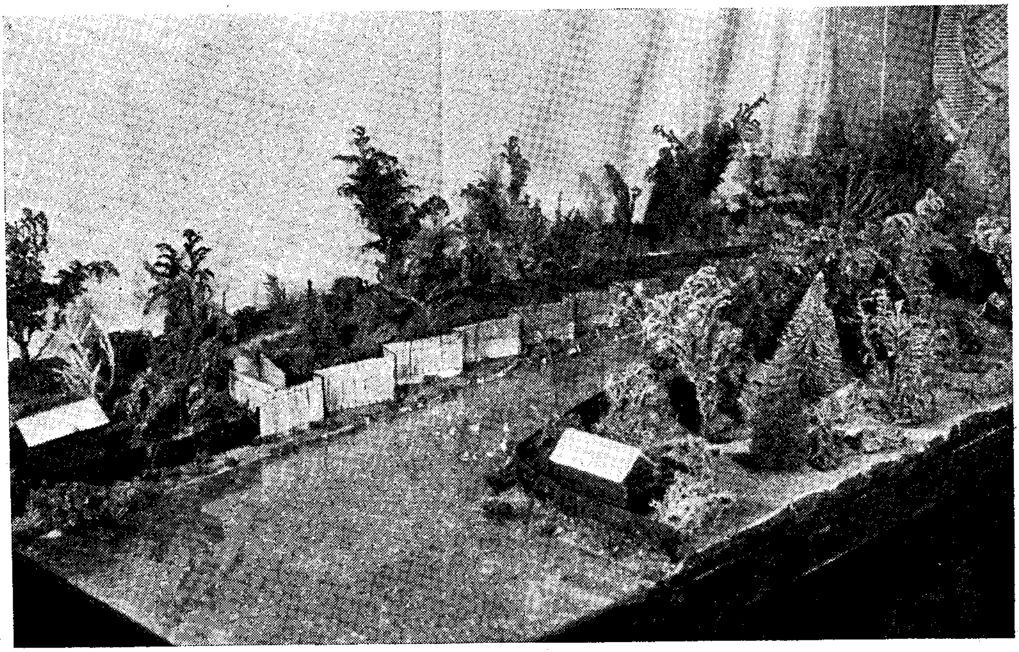
Another Spoonerism

● DURING THE run of the recent British Industries Fair, some of the London terminal stations from which special train services were operated to and from Castle Bromwich were gaily decorated. Our spooneristic representative commented that they had *flung out a lot of hags* for the occasion !

The Northampton Exhibition

● MR. W. A. WELLS, hon. secretary of the Northampton Society of Model Engineers tells us that five thousand people visited the society's recent exhibition during the seven days it was open, a result which is regarded as quite successful.

The display once again demonstrated the extraordinarily varied nature of our hobby,



especially when it oversteps the normal boundaries (as some people seem to think) into the realms of non-mechanical craftsmanship. Yet, at Northampton, one of the most unusual, attractive and original models might be regarded, in some quarters, as an outcast, so far as model engineering is concerned. But its meticulous accuracy and the craftsmanship it revealed were such as to gain it the award of the Bassett-Lowke Challenge Bowl. The model was made by Messrs. W. A. Wells and J. G. Richardson and is illustrated herewith. It is a model of the Severn Wildfowl Trust duck decoy near Gloucester.

Another outstanding exhibit was Councillor S. J. Ward's magnificent 1½-in. scale model of the old L.N.W.R. 8-ft. 6-in. single-wheeled locomotive *Cornwall*. This is the fifth of Mr. Ward's locomotive models; it is about 5 ft. 6 in. long, including the tender, and depicts the *Cornwall* as reconstructed by John Ramsbottom in 1858, so far as the very scanty information will permit. It is painted in the pre-Webb green livery and is certainly a very worthy successor to Mr. Ward's previous efforts, in addition to being a valuable acquisition to the growing number of historical locomotive models. The Northampton society is to be congratulated upon having been the first to show this model.

Model Locomotive in Church

● WE LEARN, from a recent issue of *The Yorkshire Post*, that the model of the Gresley Pacific locomotive *Flying Scotsman*, owned by British Railways, was included among the exhibits in the chancel of St. Jude's Church, Hexthorpe, at the first Industrial Sunday service to be held at the church, which is near the Doncaster plant of British Railways. We regard this as quite a happy thought on the part of the organisers of the occasion.

Chichester Broadsheet

● WE HAVE received a copy of No. 1 of a broadsheet which the executive of the Chichester and District Society of Model Engineers intends to produce bi-monthly. This is an idea which is well worth while as a means of keeping alive the interest and enthusiasm of the members, and we find that other societies have discovered the benefit of this method of holding the members together.

No. 1 broadsheet at Chichester is a single sheet, both sides of which carry brightly-written notes and news about the society's activities, announcements of future meetings and other items of a more or less domestic nature relative to members and their work.

One item we are particularly pleased to see, and is to the effect that the City Corporation has agreed, subject to the approval of the Ministry of Health, to grant a 21-years' lease of a fine plot of ground which will enable the society to provide a locomotive running track, a car racing track, a boating pool, a workshop and other amenities so much sought after by all clubs.

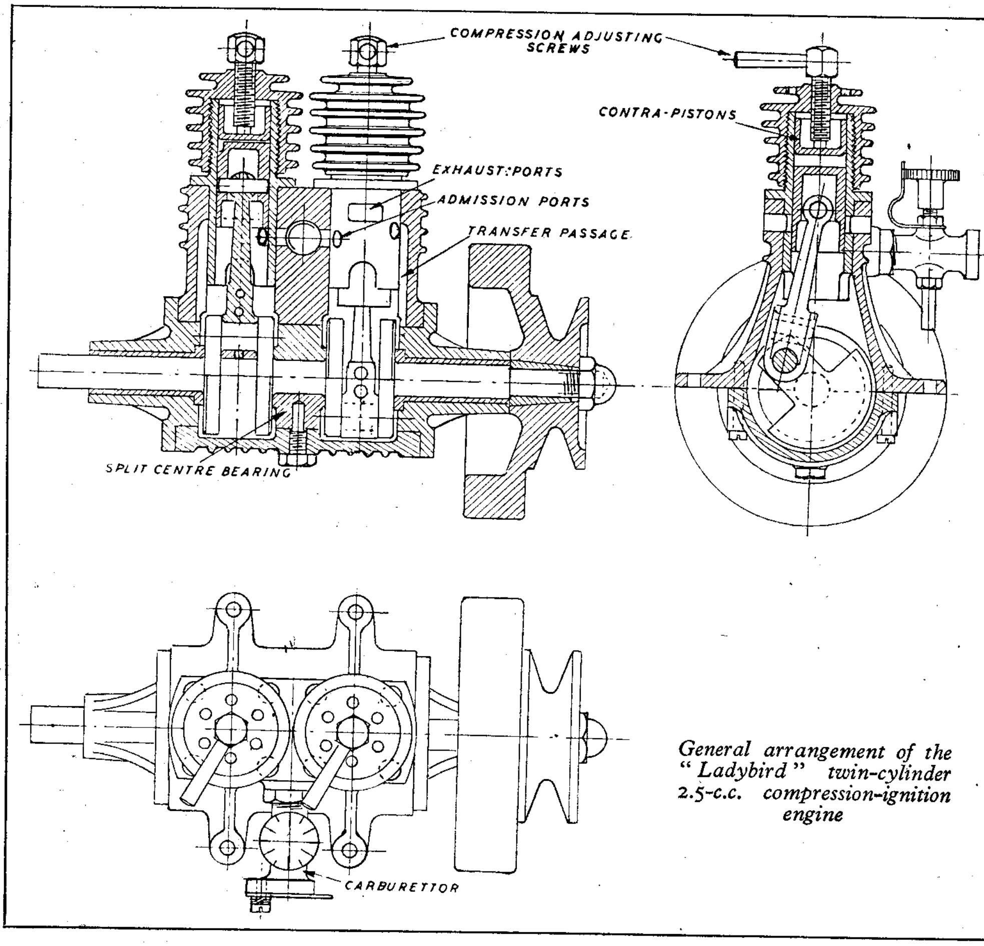
PETROL ENGINE TOPICS

A Twin-Cylinder 2.5 c.c. Compression-Ignition Engine

by Edgar T. Westbury

THERE are some of my readers who consider that the title "Petrol Engine Topics," no less than its subject matter, is outworn, outdated and outmoded; that the day of the model petrol engine is past, and that there is no longer a demand for information on the construction of such engines. I have, on more than one occasion in the past, given my reasons for believing that this is by no means true, and that despite the remarkable rise in the popularity of the commercially-made petrol engine and the compression-ignition engine in recent years, there is still scope for development of the home-constructed petrol engine, and a widespread demand for information on this subject.

During the last two or three years, innumerable readers have asked me "What are you doing (or going to do) about the 'diesel'?," and have expressed disappointment at my apparent failure to come into line with "certain other writers" who have proved themselves fully up-to-date by catering for the devotees of this type of engine. As a matter of fact, I have done, and am still doing, quite a lot about every type of engine which comes within the scope of the generic title "Internal combustion," and my temporary silence on any particular phase of current development does not necessarily betoken a lack of interest. And let me say that I am not implying any criticism of the "certain other writers."



General arrangement of the "Ladybird" twin-cylinder 2.5-c.c. compression-ignition engine

Progress is progress, no matter who makes it, and I give them full credit for every brick they have added to the edifice of small i.c. engine design. I have a common interest with everyone who is trying to assist the amateur constructor to build sound engines, or models of any kind; but the preacher of false doctrines, or the designer of "dud" engines, is no friend of mine, simply because many of the troubles which arise out of his activities are sure to come to roost on *my* doorstep!

An Important Question

To revert for a moment to the matter mentioned in the first sentence of this article, the question of terminology is a very important one, and none of my critics has suggested a good alternative title. Though truly descriptive and comprehensive, it would hardly be desirable or euphonious to substitute "internal combustion" for "petrol"; and I do hope that nobody asks me to incorporate the word "diesel." It will be observed that in all my references to the small compression-ignition engine, I have studiously avoided this term, which is neither correct nor broadly descriptive. Call it pedantry or diehard obstinacy if you will, I deplore the present-day looseness in terminology. The French, who have a flair for the apt phrase or term, have done much better than us in calling them "auto-allumage" or "etheromane" engines. I think the only excuse for the word "diesel" is that it slides easily off the tongue; and no doubt this is an important consideration to some of our "moderns," who very much prefer pseudo-americanese slang to correct technical terms.

As I have so often pointed out to readers, my constant aim in "Petrol Engine Topics" has been the development of small engine design in forms suited to the particular requirements and facilities of amateur constructors. In the various designs of engines published under this heading, I have explored this field extensively, though by no means exhaustively, and I think most readers will concede that every one of the engines has presented an interesting exercise in design, and a contribution to general progress. I have never claimed to have produced the "last word" in any aspect of design—neither the most efficient, the smallest, or the most up-to-date engine in the world—but something the amateur can tackle in the confidence that it will provide interesting mechanical exercise and repay conscientious effort when completed.

In this respect, I have not found a great deal of scope in the compression-ignition engine so far, though I do not consider it to be non-existent. Success in the construction of this type of engine depends far more upon accuracy of workmanship than upon design, and the designer has only a minor influence on the results obtained by the amateur constructor. Thus any improvement in design is difficult to check up in practice; and frankly, despite many claims made for improvements in these engines, I am rather doubtful if any of them can claim to be better designed than the original Swiss "Dyno" engine which I described in the issue of THE MODEL ENGINEER, dated November 15th, 1945, long before any such engines had been made in this country.

True, there has been much "ringing of changes"—we have had engines with piston-port admission, with rotary valves of the cylindrical and disc types; compression adjustment by contra-piston, or eccentric bearing, or none at all; flat top and deflector pistons; various port arrangements; and so on. But these things in themselves do not constitute real innovations in design, and in most essential respects, they had been done before in model petrol engines. In my exploration of compression-ignition engine design, I have formed some fairly definite opinions as to potential lines of development, but it has not yet been possible to carry practical research to the point where it will yield concrete results. There are, as yet, many mysteries surrounding the inner functions of small i.c. engines, and I do not claim to have progressed very far in my efforts to solve them. My silence on the subject of c.i. engine design up to the present, therefore, may be explained on the grounds that I am never keen to attempt directing other people on the right path until I know it myself. The type of "expert" who opens his mouth and promptly puts his foot in it is all too common nowadays, and I have no wish to be placed in this category. "Better to keep silent than to mislead," is my motto.

One respect in which the small c.i. engine differs from the petrol engine is that it works much better in quite small cylinder capacities than in larger sizes. The c.i. engines which have been made in sizes over 5 c.c. have in most cases been inefficient and rough-running, while their "startability" and docility have certainly been no better than smaller engines. On the other hand, no limit has yet been found to the reduction of size possible in c.i. engines, providing scale accuracy is observed, and also requisite delicacy of adjustment. I have formed the opinion that in cases where increased power and cylinder capacity is required, it is better to duplicate or multiply the cylinders of these engines than to increase their bore and stroke. In this respect they have a definite advantage over the petrol engine, in that this course does not entail complication in ignition equipment, which has often proved a serious practical obstacle to the development of the small multi-cylinder petrol engine.

For about twelve months now I have been making experiments with a small twin c.i. engine, the results obtained from which have been sufficiently promising to justify offering it to readers as my first definite contribution to the design of the small c.i. engine.

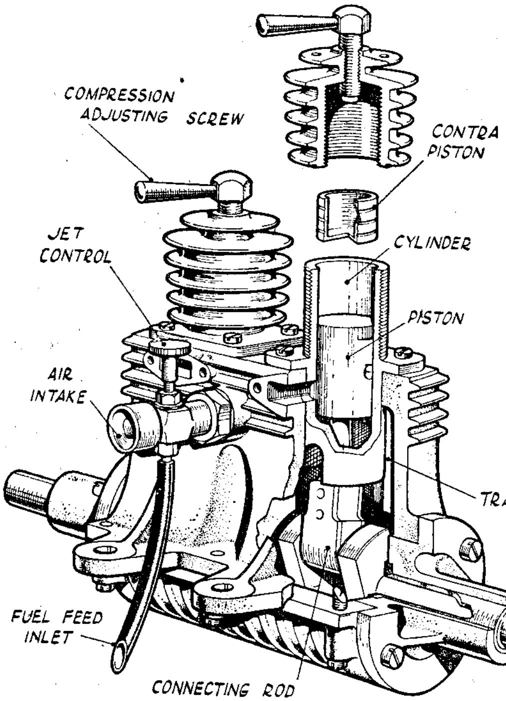
The "Ladybird" 2.5 c.c. Engine

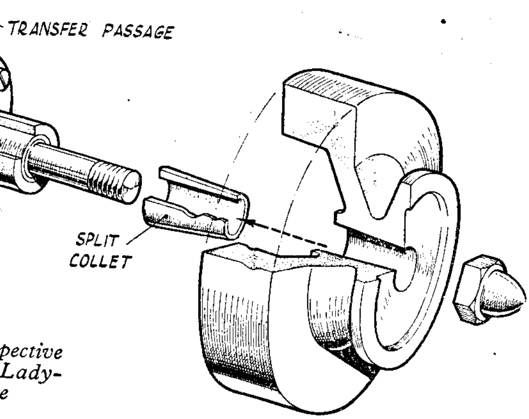
No claim whatever is made in respect of functional improvement in this engine; it consists virtually of two single-cylinder engines of 1.25 c.c. each, coupled together with the cranks at 180 deg., and with the inlet ports arranged so as to be fed from a common induction passage. In conformity with most of the existing engines working on this principle, compression adjustment is provided by screw-controlled contra-pistons, this device being the most convenient in the particular circumstances. The adjustments are independent, but could be interconnected if this should be found desirable.

Such merits as can be claimed for the design lie purely in the realm of mechanical arrangement and methods of construction, which are, as always, devised to provide interest to the constructor, with considerable adaptability in detail design, and latitude for the free-lance who wishes to express his own individuality in producing something "a little different." The appearance of the engine, I think, is on the whole rather attractive ; at any rate, it does escape the outright ugliness which seems to be the salient feature of some of the commercially produced engines at the present day, and it will enhance the appearance and dignity of the model aircraft, boat, or car, to which it is fitted.

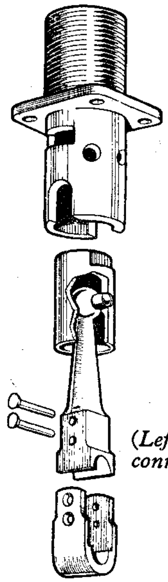
A good deal of pains have been taken to plan the design to suit the methods of construction and general facilities available to the average amateur, and there are no serious difficulties or snags in the machining operations if they are carried out in the manner to be described. At the same time, I would emphasise still further the advice which I have so often given in the past regarding the need for care in obtaining accuracy and finish of the essential working parts, particularly the cylinders, pistons and contra-pistons. While the methods which I have described in connection with similar components in petrol engines are still applicable, compression-ignition engines demand a still higher degree of precision, and this often proves to be a decisive factor in their success.

One thing that no designer can ever do for the constructor is to supply the skill, care and patience which are essential to enable him to do full justice to the design, and I know only too

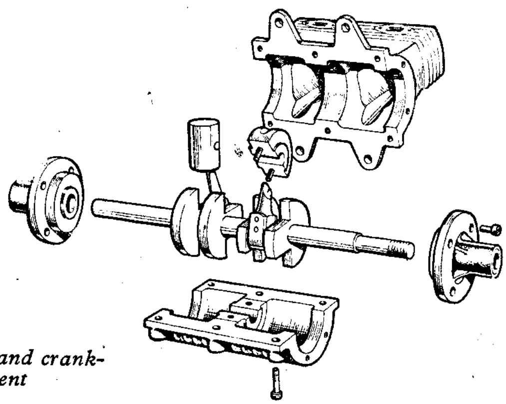




Part-sectional perspective drawing of the "Lady-bird" engine

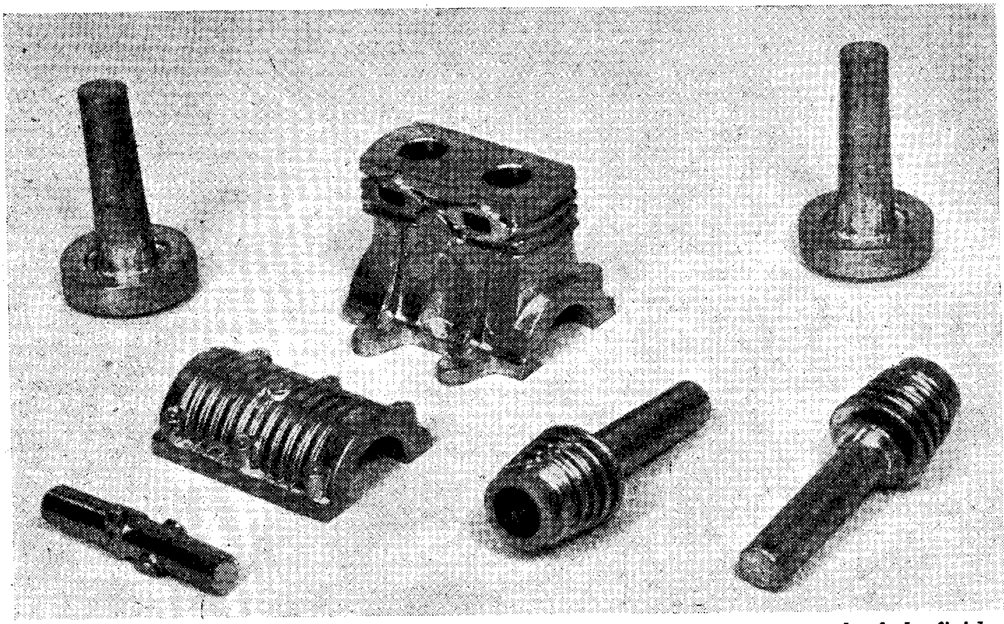


(*Left*). *Cylinder, piston and connecting-rod arrangement*



(*Right*). *Crankshaft and crank-case arrangement*

well how many amateurs—and not only raw beginners, either—come to grief through lack of these qualities. To many of my readers, this advice may sound like tedious repetition of a well-worn topic, but it can never be repeated too often. I, and no doubt many other designers, find no escape from the ever-increasing wail of the unsuccessful constructor, " Dear Sir, I have built one of your engines *exactly* (always underlined) to the design, and it doesn't work, the design is obviously no good, and I have spent any amount of time and money on it—and what are you going to do about it ? " It is no use telling the constructor flatly that his work is just not quite good enough—the mere suggestion is an insult—but it is nearly always quite true, nevertheless!



Set of die-castings for the construction of the " Ladybird " engine (see the photograph of the finished prototype engine on the front cover of this issue)

Constructional Principles

The main body of the engine is a monobloc casting, bored vertically for the reception of the two cylinder liners, and containing the main ports and passages. It may be observed that the prototype engine seen in the photographs differs in minor features from the finished design, as the latter incorporates detail modifications and improvements found desirable in the course of experiments. Die-castings are now available for the main components, from Messrs. L. D. Johnson, 2, Rowan Way, Northfield, Birmingham, or Craftsmanship Models Ltd., Norfolk Road Works, Ipswich. Readers should note that these firms, or their appointed selling agents, are the only authorised sources of supply, and I cannot entertain any complaints regarding castings obtained from any other source.

The crankcase is split on the horizontal centre-line, the upper half being formed in the body casting and the lower half in a separate sump casting. Bushed housings are attached to the ends of the crankcase, and form the outer main bearings. It is, of course, necessary, in a twin two-stroke engine, to isolate the separate crank chambers, and this necessitates the fitting of a split centre bearing, which has been designed so as to simplify both machining and fitting operations.

Flanges are provided on the cylinder liners to enable them to be secured to the top face of the body, and their upper extensions are screwed to take internally-threaded cylinder heads or " bonnets " enclosing the contra-pistons. The working pistons are machined from the solid, and have sunk or " negative " deflectors.

The crankshaft is machined from the solid, and this necessitates the use of split big-end bearings, which in this case are of the strap type, in order to economise room in the crankcase, and maintain a fairly high compression ratio therein. Both the rods and straps are of duralumin, with no bushes at either the big or little ends. The straps are held on by cross rivets after assembly, again to economise space and ensure permanent security.

For the rest, there is very little that differs from normal practice in single-cylinder c.i. engines, and except for the extra number of parts, there are no greater difficulties in construction. I am quite certain that any reader who is capable of building a single-cylinder engine and getting it to work will be equally successful with this engine.

Advantages—if any ? Well, the theoretical

(*Continued on page* 698)

*TWIN SISTERS

by J. I. Austen-Walton

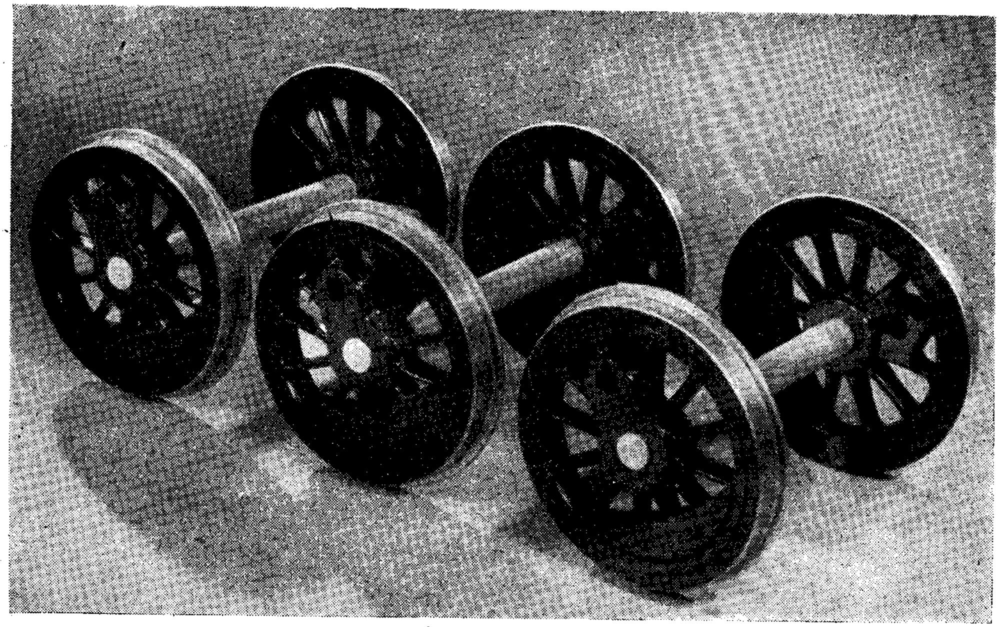
Two 5-in. gauge locomotives, exactly alike externally, but very different internally

NORMALLY, I would continue with a description of the brake and spring hangers, as these can be fitted to the frames for good, whilst the brake arms and shoes should be in position before the wheels and axles go into place.

I shall, however, break away for a description of the wheels, axles, and axleboxes, in order to give you and our trade friends a chance to cope with the patterns required. A wheel pattern needs to be carefully made, and takes time to complete, and, in this case, I am giving the alternative wheel arrangements for " Major " and " Minor " so that you may take your choice, and to let the trade folk have the full position regarding these alternatives and the consequent variations in pattern making.

For " Major," the ideal set would be a fully-spoked wheel with thin rims, for the shrinking on of steel tyres, and no balance weights cast in. In this case, the pattern would be the same for all wheels. The alternative would be a set with thin rims as before and cast-in balance weights, necessitating two patterns, due to the two sizes in the weights.

For either " Major " or " Minor " we could add the all-cast wheel, with tyres and weights, this being the usual form supplied for locomotive builders. These patterns could take the place of the second type suggested, by merely thickening up the rims of the wheel castings, leaving the steel tyres exponent with the additional work of machining off a lot of surplus metal.



A group of wheels

I think I would tackle the problem from the pattern end, by making the wheels with loose wooden rims that could either be left on, or taken off, according to requirements. The pattern maker will tell us that the loose rim, when taken off, would not permit of any " draft " angle for lifting out of the sand, or else a " draft " angle in one direction only, so complicating the drawing of the true spoke section. A good moulder can lift a straight-edged circle without spoiling the mould, but only when the edge surface is really good, and free from " pimples " and ridges.

" Major " should have all balance weights built up like the prototype, and the steel tyres if possible, but " Minor " has an easier specification to follow, and the alternatives given should cover every need.

From the castings viewpoint, the axleboxes are simplicity itself, and can be made in simple

**Continued from page 577, " M.E.," May 12, 1949.*

stick form, cutting off the required lengths from the cast bar. This applies to both "Major" and "Minor," although the latter may use perfectly plain bearings, if it is desired to miss out a really interesting part of the main works.

The full roller-bearing designed for "Major" can be made entirely from steel bar, for the interior parts, and these are housed in the actual bronze block of the bearing. There are no grinding operations to perform and no very tight limits on any of the diameters of the races. The rollers are made from $\frac{1}{16}$-in. silver-steel rod, selected if possible. By this I mean that it is advisable to take your micrometer with you when you make your purchase of stock.

The standard 13-in. lengths of silver-steel are usually very reliable, and you do not find many lengths that are either off the advertised diameter, or subject to being ovals, or incorrect in their section; but it is as well to adopt the safeguard of running over the lengths with your micrometer whilst at the counter.

In order to give weight to this profound statement, I took half-a-dozen random lengths of silver-steel from stock, and measured each one with a vernier micrometer. I could not detect any variations exceeding 1/10 of a thousandth in any part of the rods taken.

Our dimensions on the axleboxes do not call for limits as close as this, for it is necessary to leave enough clearance between the rollers and the inner and outer races, for the axles to float lengthwise. If it were not for this allowance there would be binding of the axleboxes in the horns, due to their inability to adjust themselves during unequal wheel movement.

An examination of the drawing will show two simple felt oil retainers, which should keep the box full of oil at all times, even when quite hot, and these are not affected by the sliding movement of the axle through the box. An equally important aspect of the fitting of the felt retainers lies in their ability to keep out dust and ashes, especially in the case of the trailing axle which is immediately under the grate and ashpan.

Before going on to the full machining of the axleboxes, and having, for the moment, covered the question of patterns, let us return to the turning of the wheels.

First of all, get rid of all the sand in every part of the wheel. Use your old files for this work—large and small—and see that you have one or two very small rat-tail files running from $\frac{1}{8}$ in. or smaller at the point, and not exceeding 5/32 in. at the thick end.

One or two files of this order will be needed for finishing operations; there are plenty of these about, and they cost very little in the rather coarse grades required. The old, big files may be used to scrape away the flat surfaces on the crank bosses, and round the rim and tyre edges and faces. The little files should be used in between the spokes, taking care to get rid of all the ridges and "flash" round the spoke centres. Anything that can be scraped off should come away, and the correcting of the shapes and curves of the spokes and rim bases should be left for a file that is not quite so worn by the coarser sand removal operations.

The look of the finished wheel will depend, to a great extent, on how well you have blended out the many curves and radii, and this is far more important than trying to achieve a super-smooth finish. The coarse files do help in this respect, for the surface they leave is an ideal one for holding paint.

It is not unusual to encounter an occasional hard spot, especially round the thinner sections of the spokes, and it does no harm at all to put offending castings in the fire at night, or in the domestic boiler for an hour or so, and I have rid myself of much trouble of this kind in this way; all you do is to anticipate the maturing process that otherwise only time and weathering can do for you.

All this scratching and picking about, is a tiresome job and is apt to make the fingers uncommonly sore and blistered; but it is worth while because of the knowledge that you are getting the best out of the castings, and are not endangering the lathe with showers of sand over everything, when making the first machining cuts.

So far, so good; now grip one wheel in the 4-jaw chuck, back outwards, and make it run as true as possible with the wheel boss and the *inside* of the spoke rim. Forget all about the *outside* edge, and if the boss and inside edge refuse to respond to the same setting, then you must compromise, so that the setting gives about an equal amount of wobble on each. Take a good facing cut off the back of the rim and boss, remembering that the latter will protrude a little beyond the rim face when finished.

Once you have got clean metal facing on both rim and boss, check over with the drawing to see that there is not too much metal left to be taken off the reverse side; you can see that it would be well possible to reduce the width from one side of the wheel, that all the spokes would be flush with the back, and excessively sunk in from the front.

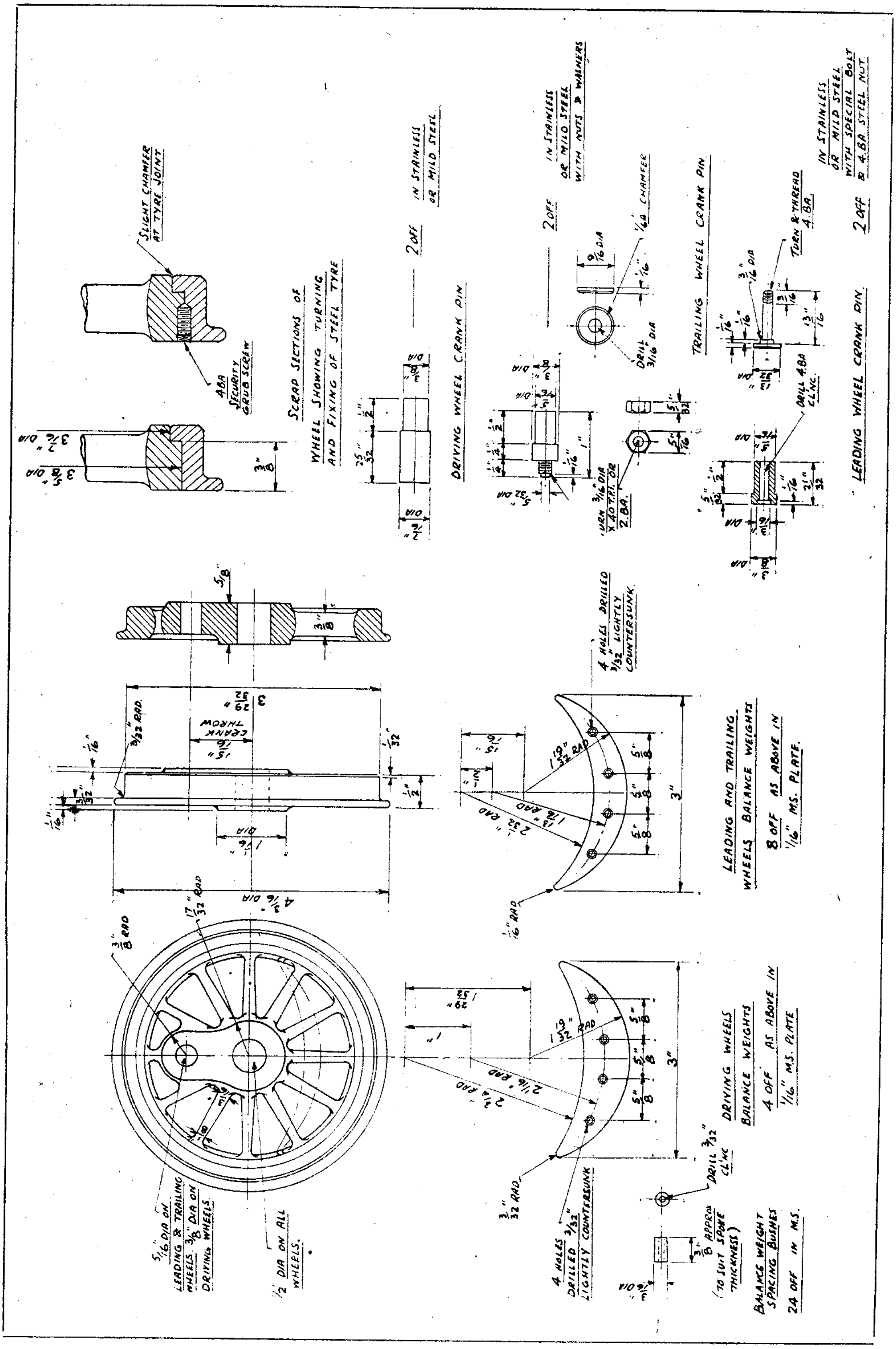
Having secured a reasonable facing with the wheel boss projecting to the dimension of the drawing, and also machined off, centre and drill $\frac{1}{8}$ in. or $\frac{3}{16}$ in. right through, followed by a $\frac{7}{16}$-in. drill if the first drilling runs true, and by a $\frac{3}{8}$-in. if the pilot hole runs much out. The finished hole should be $\frac{1}{2}$ in. diameter, and a small boring-bar is the only certain method of getting a true hole.

On a very accurate machine, a reamer held in the tailstock or supported on the back centre, should produce a parallel hole, but only if the first hole is itself running dead true.

The finished bore of all six wheels may turn out to be a few thousandths under or over the $\frac{1}{2}$ in. diameter, but this does not matter provided all wheels are the same. If you bore the wheels, use an odd piece of silver-steel as a plug-gauge, taking light scraping cuts until the plug will just enter the bore, and, before removing the wheel from the chuck, make a slightly rounded or chamfered entry to the bore with a graver or hand scraper; this helps later on with the pressing of the wheels on to the axles.

Do not make any other machining cuts on the wheel rims or tyres at this first setting.

Now take a piece of steel bar, and turn down one end taper, to suit the headstock socket, leaving the other end long enough to project $\frac{1}{2}$ in. or so beyond the surface of the faceplate,


SLIGHT CHAMFER AT TYRE JOINT
4BA SECURITY GRUB SCREW
SCRAP SECTIONS OF WHEEL SHOWING TURNING AND FIXING OF STEEL TYRE
DRIVING WHEEL CRANK PIN
2 OFF IN STAINLESS OR MILD STEEL
2 OFF IN STAINLESS OR MILD STEEL WITH NUTS & WASHERS
TRAILING WHEEL CRANK PIN
LEADING WHEEL CRANK PIN
2 OFF IN STAINLESS OR MILD STEEL WITH SPECIAL BOLT & 4.BA STEEL NUT.
TURN & THREAD 4 BA.
DRILL 4.BA CL'NC.
4 HOLES DRILLED 3/32" LIGHTLY COUNTERSUNK
LEADING AND TRAILING WHEELS BALANCE WEIGHTS
8 OFF AS ABOVE IN 1/16" M.S. PLATE.
DRIVING WHEELS BALANCE WEIGHTS
4 OFF AS ABOVE IN 1/16" M.S. PLATE
5/16" DIA ON LEADING & TRAILING WHEELS. 3/8" DIA ON DRIVING WHEELS.
1/2" DIA ON ALL WHEELS.
4 HOLES DRILLED 3/32" LIGHTLY COUNTERSUNK
DRILL 3/32" CL'NC
(TO SUIT SPOKE THICKNESS)
BALANCE WEIGHT SPACING BUSHES
24 OFF IN M.S.

when both are fitted. Tap the taper bar firmly into the mandrel socket, and turn down the projecting end to a diameter that will just permit the wheels to push on. Either relieve the turned diameter of the bar, or continue the turned portion past the faceplate surface, so that the wheel casting, when placed on the bar, machined face first, rests on the faceplate and is not held out from contact by the turned spigot.

Now face back the bar or spigot until it projects from the faceplate by the dimension of the finished thickness of the wheel, *through the boss.* Then fit one wheel with the yet unmachined face outwards, and hold it in position by means of at least two bolts between the spokes, preferably diametrically opposite to each other. Turn the outside face of the rim and the tyre diameter, leaving the rim edge unmachined, but not forgetting the little chamfer shown on the drawing ; make this a definite and clearly-cut chamfer, and not a mere rounding off to the edge which looks worse than awful.

If you are making the all-cast wheel without separate tyres, then, with a vee-pointed tool, put in a little ring round the wheel face where the tyre joint should come. The drawing gives the actual dimension for this.

The holding bolts may prevent your getting at the crank face for machining, and, if this occurs, remove the bolts and replace them outside the finished rim with small dog plates to bear on it, and packing pieces to balance the plates. Machine off the crank face level with the end of the turning spigot, which is now a guide to finished thickness. Cast-in balance weights may also be faced off at this stage, and are left just proud of the wheel face. To accentuate and even up the junction line between the outer edge of the weight and the wheel rim, again use a vee-tool to make a light cut at the join.

As to variations so far, the only one that occurs to me can be directed to the builders who are machining wheels without balance weights, and shrunk-on tyres. In the latter case, the turning of the stepped outer wheel rim calls for the following comment.

The smaller diameter, or back step is the one that really matters, and an effort should be made to keep the diameter, if not exactly to drawing, at least uniform for all wheels. Do not forget the slight chamfer on the edge of the step, and, at the same time, avoid overdoing it ; there is a corresponding chamfer on the tyre, and the joining up of these two should not look unduly wide.

The larger diameter, but shorter step at the front of the wheel acts only as a stop for the tyre, but here again, try to keep the diameter about equal for all wheels.

By reversing the wheels on the turning spigot, the rims come within easy reach for machining, and the radii over the top and back, and blending into the tread, can be given the care they need. Keep the turning spigot for future use, and resist the temptation to turn it down to suit some other job. It is such a useful thing to keep, and you never know when you may want it for some future skimming or turning adjustment ; you can always be sure of slipping a wheel back on the lathe, and that it is bound to run true—that's half the battle.

The drilling or boring of the crankpin hole in the wheel, may be dealt with in a simlar way. In this case you will require another spigot or pin, set either in one of the faceplate slots, and nutted up behind, or set in another piece of plate and bolted to the faceplate. In either case, it is imperative that the spigot sits fair and square to the plate, and does not lean over one way or another ; also that it shall remain undisturbed in position until all the wheels are completed.

Bolt up the pin, and with the centre in the tailstock, measure carefully between this centre and the inside wall of the pin, taking half the diameter of the pin away from the crank throw dimension, this being the same as measuring from the centre of the pin and the tailstock centre, and is much more reliable.

Slip on each wheel in turn, and by bolting them to the plate, between the spokes as before, with the tailstock centre resting on the centre of the wheel crank, you can complete the bolt tightening, and centre and drill, finally reaming the hole to its finished diameter. Here again, the same rule applies where the drill has strayed —even slightly, and to follow on by reaming is just courting trouble. It will once more call for boring strategy, and a piece of silver-steel as a plug-gauge.

Many of the troubles encountered in coupling-rod binding are due to inequalities in the crank throws, often when incorrect " quartering " of the wheels on the axles has been unjustifiably suspected at a later stage.

(To be continued)

Petrol Engine Topics

(Continued from page 694)

improvement in smooth running which should be obtained by duplicating the cylinders is not invariably realised in practice, but the individual power impulses, for a given power output, are bound to be halved, and this imposes less stress on the engine foundations and generally reduces wear and tear. Balance is improved, except for the rocking couple introduced by the see-saw effect of the opposed reciprocating masses, which is only partially cancelled by forming balance weights on the crank webs ; but this has not proved troublesome so far.

But perhaps the most attractive feature of the engine is that it enables something a little closer to prototype character to be installed in a power model of any kind ; though still a long way from true realism, it is a step in the right direction, and if one does not scorn to revert to " camouflage " (I am not at all keen on putting anything into a design which is not essential or desirable to function or utility) it could be disguised to look very much like a prototype marine diesel engine.

(To be continued)

A HAND BENCH SHAPER

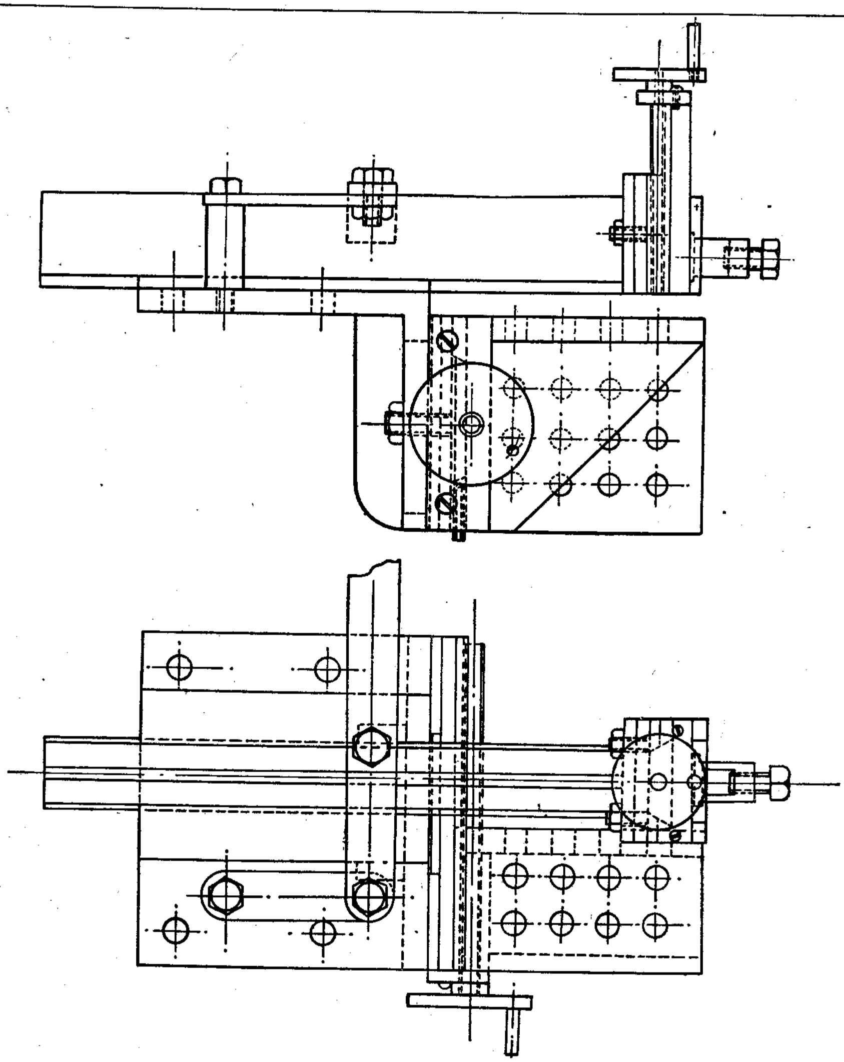
by F. T. Leightwood

WITH a lathe and a drilling machine built and working, I began to design a milling machine, but this I found needed too many things that I couldn't make myself, and cutters are pretty expensive; so I decided on a shaper.

Like the lathe, rather than make patterns and wait for castings I used steel bar welded and riveted together. In the drawings I have indicated rivets by centre-lines only, and, incidentally, they are all countersunk rivets.

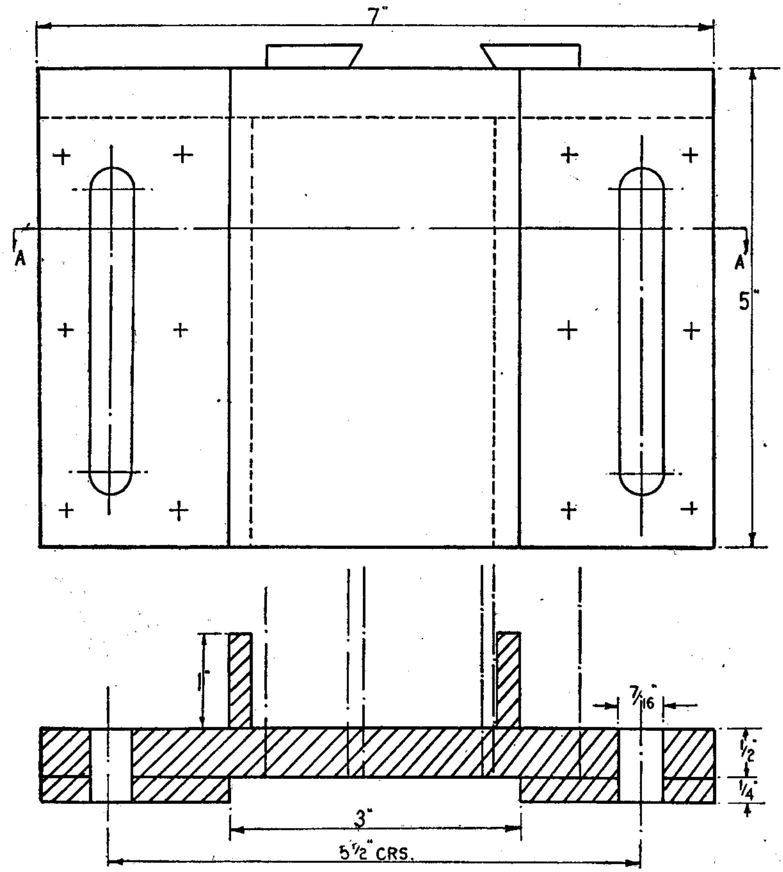
Starting with the base I obtained a piece of angle 6 in. × 5 in. × ½ in. section, 7 in. long, down the shorter side of which I had welded two pieces of 1-in. × ¼-in. bar, as shown in the drawing. I then had the top and front faces machined by a friend with a full-size model.

To the front face I riveted two pieces of ¼-in.



Two views of the hand bench shaper

plate, one at each side, setting the first piece with a square along the inside edge and across the top of the "base," and the second with the tenon piece in place, having first trued up the faces and edges. When this was done, I trimmed up the edges level with the edges of the angle and then bedded the faces to the surface-plate. To complete this stage I marked off the slots, and drilling a $\frac{7}{16}$-in. hole top and bottom, I put a brand-new high-speed steel blade in my hacksaw and cut the slots out.



SECTION ON A.A.

Plan and section of the base

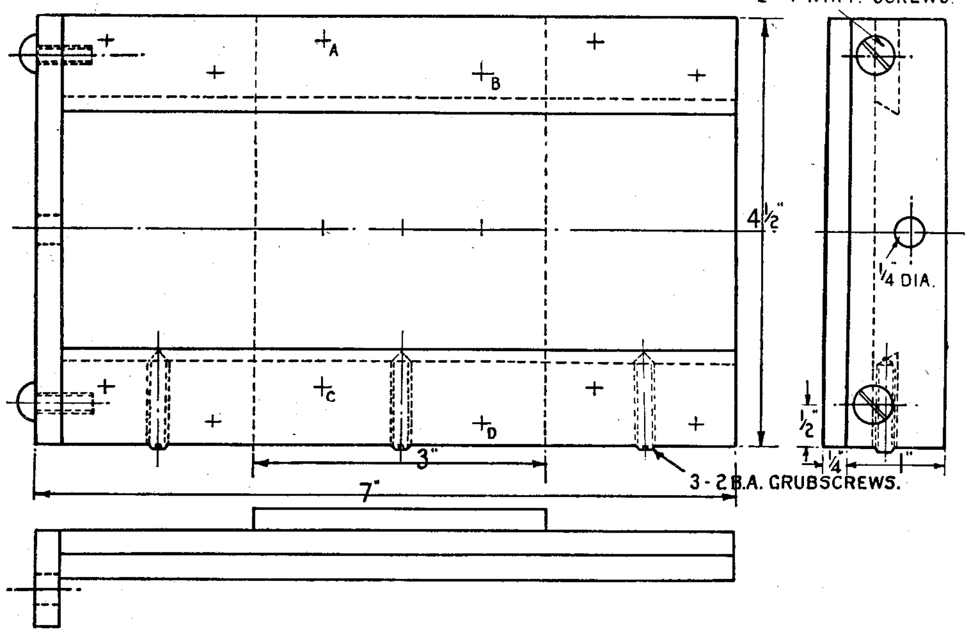
The Backplate

This part (which, incidentally, I have shown as only $\frac{1}{4}$ in. thick, but should be $\frac{3}{8}$ in. thick) came next. I had the plate faced up on both sides, so all I had to do was square the edges off. The first piece to be fixed to it was the top guide strip. This, of course, was simply clamped to the plate with the edges level and the end rivets fitted first. Next I placed the sliding strip in position (the one attached to the work-table) and the gib strip, then the lower strip clamped on ready for drilling and riveting after a check to see that the sliding strip was free, without being excessively so. With all these rivets in and tight, I drilled the 2-B.A. tapping holes for the grub-screws and fitted these, making a small dimple in the gib strip to prevent it moving sideways in use.

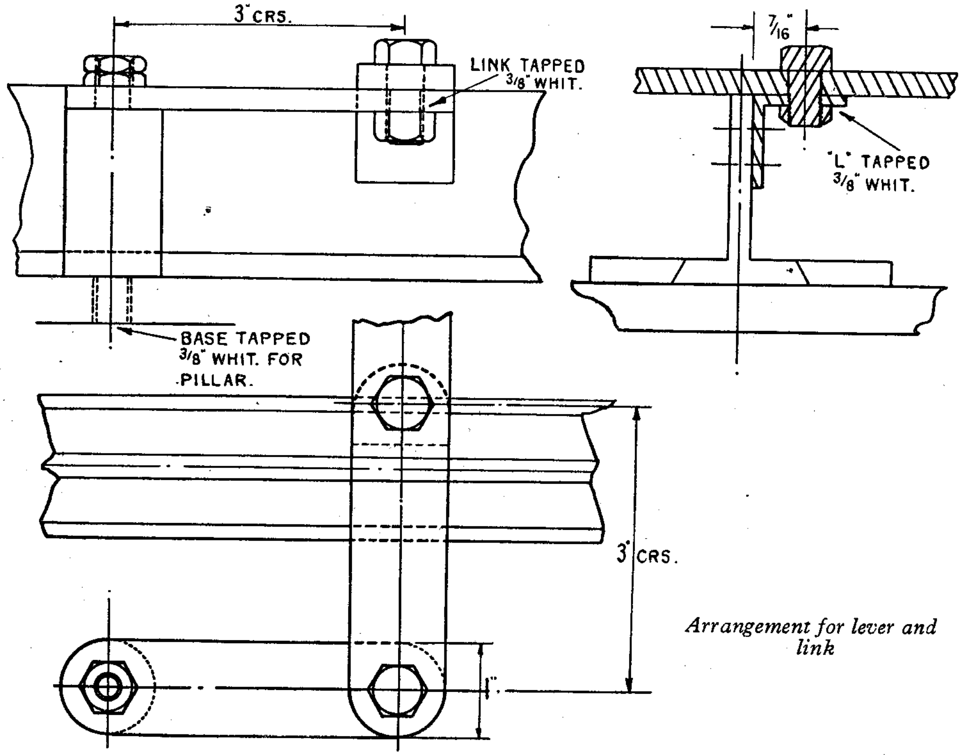
After the drilling, I bedded the working faces of the top and bottom strips to the surface-plate, leaving the edges till later.

Work-table

The work-table was built up in a similar manner to the base. A heavy piece of angle with plates welded to it then machined up on the big power shaper. To set it in position I placed it face downwards on the surface-plate, then I



Details of the backplate

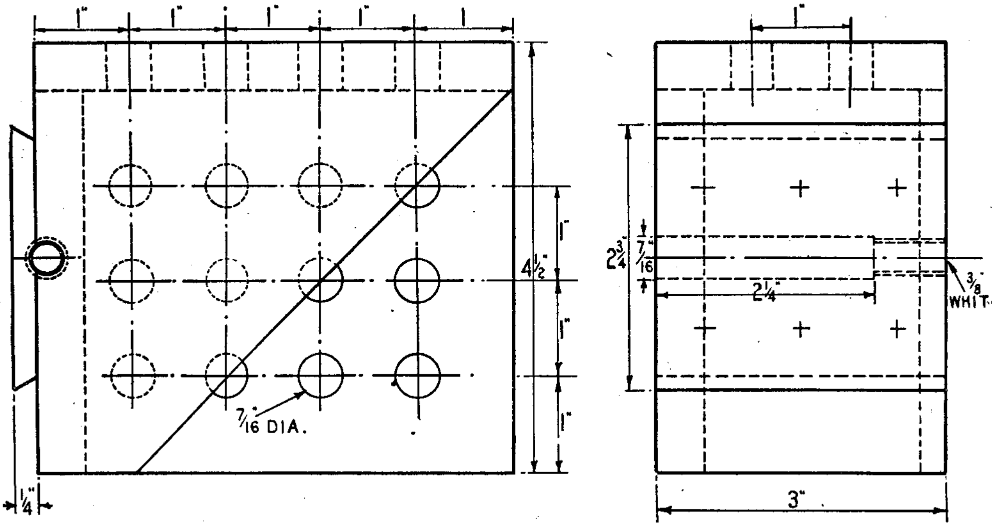


Arrangement for lever and link

stood the backplate against it with the sliding strip in position. Holding them together like this I marked a line each side on the work-table and the strip, then I dismantled the assembly and, clamping the strip to the work-table with the lines carefully aligned, I drilled and riveted the two together with one rivet. After a check by setting up in the same manner as before I drilled and fitted the remaining rivets.

the other two for the round-headed screws I fitted after marking the tapped holes in the backplate from the thrust-plate.

With the work-table in position behind the thrust-plate, I made a countersink with a ¼-in. drill pushed through the hole in the thrust-plate, then dismantling the work-table I drilled through with a 5/16-in. drill then turning the table over I counterbored the hole with a 7/16-in.



Details of table

As the face of the sliding strip has to clear the backplate, I filed it down until I could put the two parts together and slide a feeler between them while the faces of the upper and lower guide strips were in close contact with the work-table, after which I bedded the edges of the strips together until, with the grub-screws adjusted properly, the work-table slid smoothly from one end to the other without any perceptible loose play.

Fitting the Rivets

With this done I drilled and tapped the ⅜-in. holes for the studs in the backplate and, using them to clamp the base and the backplate together (with the work-table in position), I laid them upside-down again on the surface-plate, this time to set the tenon piece, by offering a square up against the vertical face of the work-table. With the tenon piece thus set, I carefully dismantled the assembly and, using a clamp to assist the single rivet during the drilling, I drilled and fitted a second rivet. After a check to make sure nothing had shifted, the remainder of the rivets were fitted.

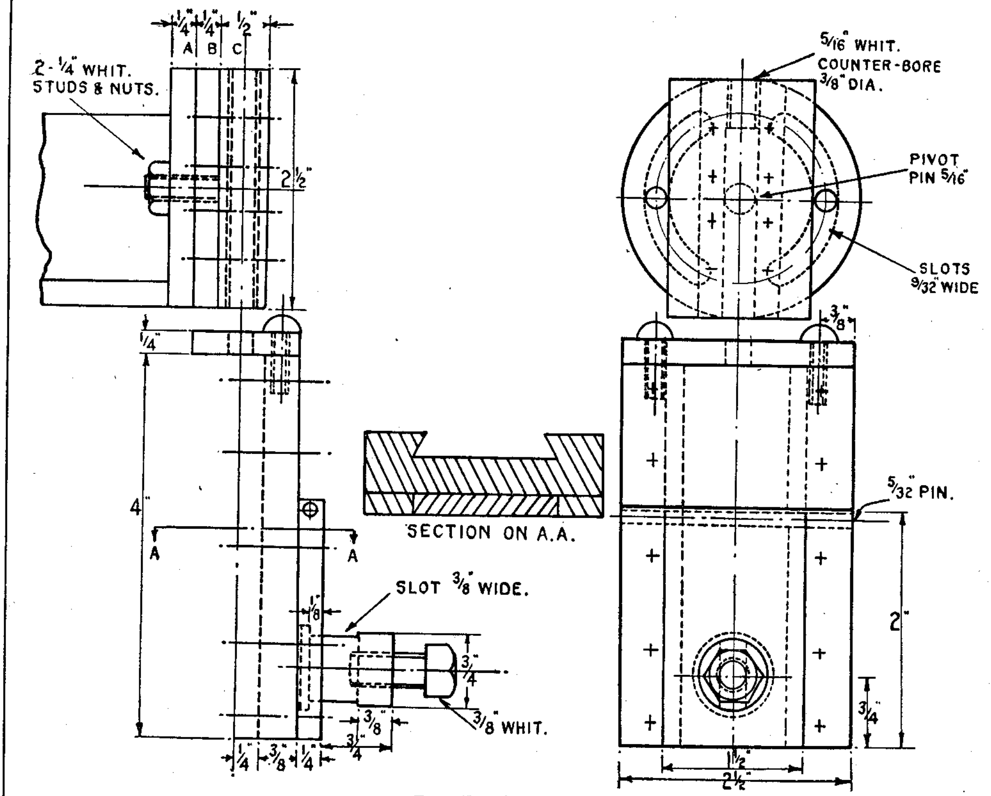
The cross feedscrew, a long ⅜-in. Whit. stud, with the short-screwed end reduced to ¼-in. diameter and screwed to take the hand-wheel was next to be fitted. First I drilled three ¼-in. holes in the thrust-plate; one for the "screw," and

drill leaving about ¾ in. for tapping. To tap the hole dead square I used a taper tap of the type with a shank well below the size of the threads (most ⅜-in. taps have a ⅜-in. shank) which is a neat fit in the slightly oversized hole made by my ¼-in. drill. So, putting this through the thrust-plate in the same way as the thrust-screw is fitted, I led the work-table up to it and screwed the tap through till it fell out of the hole on the other side, when, after cleaning the hole out, I replaced it by the screw, fitting the hand-wheel and locknut with it. The ram, a length of "T" bar 2 in. × 1½ in., was machined on the underside and the edges chamfered to 60 deg.

Setting the Ram

With the work-table raised above the level of the base I placed the ram in position with the guide strips clamped at each side of it on the base. To set the ram in its true position I wound the work-table across until the side-face was just touching the ram and with this set up I drilled and riveted the left-hand strip to the base, the right-hand strip being held by ¼-in. set-screws and the holes slotted for adjustment.

The slotted plate which is welded to the front of the ram carries a 5/16-in. pin (made by cutting the head off a 5/16-in. bolt and a saw-cut for the



Details of ram-head

screwdriver) and the disc to which the head-slide is riveted has a corresponding hole in its centre, and, of course, the two $\frac{1}{4}$-in. Whit. studs which lock the head at the desired angle when in use.

The guide block for the head-slide is riveted to this disc by $\frac{1}{8}$-in. rivets and the head-slide itself is built up in the same way as the other slide; but as there is no means of adjusting it all the faces had to be scraped to a good "bed" *before* riveting and a little careful easing afterwards to make a smooth yet fairly stiff sliding action. This is very important as too much freedom here permits the slide to drop to the lower limit of the working clearance of the feed-screw then, when the cut begins, the tool tends to dig in even when only light cuts are being taken.

The Clapper Box

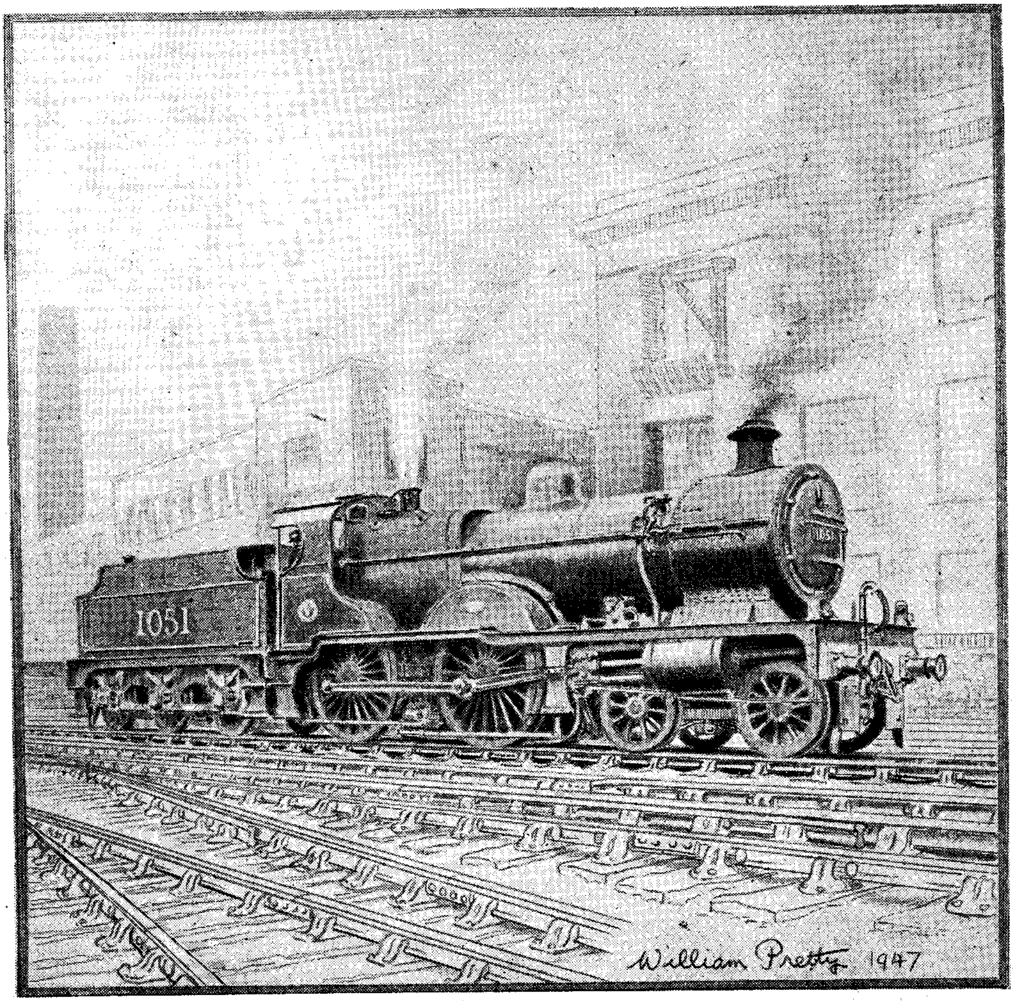
The clapper box needs to be fairly free as it must drop back to the cutting position immediately the tool clears the work on the return stroke.

The toolpost and its counterbored hole in the clapper box were both turned in the lathe and the slot for the tools made by drilling a $\frac{3}{8}$-in. hole through the toolpost and opening it out with a $\frac{1}{4}$-in. square file.

All that now remained was the operating lever assembly, this being set so that the lever was at right-angles to the ram when the *tool* was half-way across the work-table. The lever itself is 18 in. long and the outer 9 in. has the edges radiused off to form the handle. As shown in the drawing, one hole in each half of the joints is tapped and the pivot bolts are screwed in and locked with a nut on the underside. The post that supports the fixed end of the link is screwed into the base (and filed off flush underneath) and the upper end has a short plain section $\frac{3}{8}$ in. diameter for the link and two lock-nuts.

This completed the machine and so I tried a few tests, bolting pieces of various metals on the work-table and trying different shaped tools. I found that for planing, a tool with about $\frac{1}{8}$-in. radius was O.K. for roughing but a nearly flat tool slightly radiused gave the best finish. To save time when changing tools I made both these cutting edges at either end of a long piece of tool-steel so all that needed to be done when changing over was simply to slacken the set-screw and turn the post 180 deg., tighten up again and resume cutting.

A "Crimson Rambler"



THE illustration reproduced on this page is taken from another of Mr. W. Pretty's fine pencil drawings. It depicts one of the well-known Midland compounds which, at one time, were a very popular class of express passenger engines on the old Midland Railway and, later, on the L.M.S.R. So widespread did the use of these engines become on the L.M.S.R., after the grouping of railways in 1921, that they earned the rather apt soubriquet of "Crimson Ramblers."

The class owed its origin to a batch of five 3-cylinder compound 4-4-0 engines designed as long ago as 1902 by Samuel Johnson and having one h.p. cylinder 19 in. by 26 in., and two l.p. cylinders 21 in. by 28 in.

In 1905, R. M. Deeley, taking the Johnson engines as a basis, built 40 more to the same general dimensions, but with modifications to external details, and about ten years later, rebuilt the Johnson engines to conform to the later design. All the foregoing engines had 7-ft. coupled wheels and, in later years, were all fitted with superheaters.

In 1924, Sir Henry Fowler, Chief Mechanical Engineer of the L.M.S.R., began the construction of no fewer than 195 new engines of the class, similar to the Deeley engines except that the diameter of the coupled wheels was reduced to 6 ft. 9 in., and the stroke of the l.p. cylinders was shortened to 26 in. No. 1051, depicted in our picture, is one of this latest batch.

It is generally conceded that these two hundred

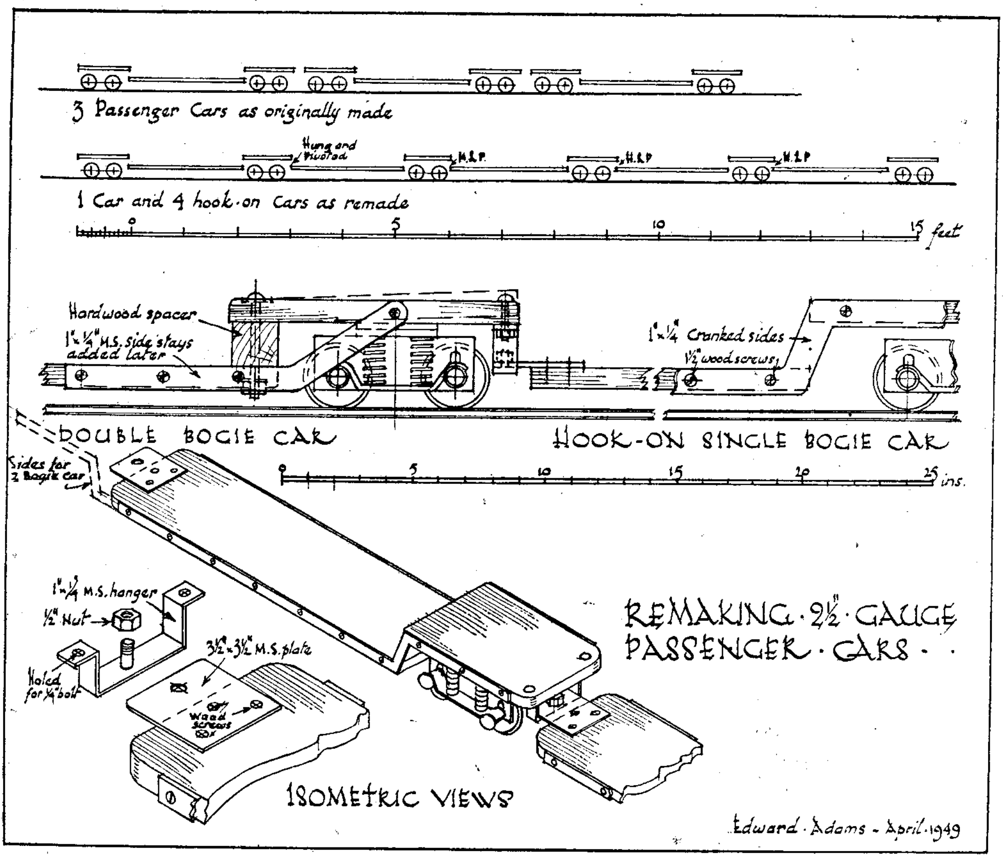
(*Continued on page* 709)

The Adams-Gresley Articulated Train

by "L.B.S.C."

IN between my instructions for locomotive building, several different types of passenger-carrying cars have been described, ranging from a simple seat-board with two bogies consisting of blocks of wood, with pin-drilled recesses for the ball-bearings carrying the axles, to an elaborate outfit on Bettendorf-Andrews type bogies, with double-row self-aligning ball-bearings, and power-operated brakes, both air and hydraulic. Several readers have made their contributions to the "carriage and wagon dept.", so that the whole field has been pretty well covered. However, you can bet that if there is any radical alteration to be made, which will be a sound job with guaranteed efficiency, there is one person who will be sure, as night follows day, to scheme it out and put it into practice; and his name is Edward Adams. They say there is nothing in a name; well, according to history, the first man was named Adam — 'nuff sed!

When the Falls Grove Railway was first opened for regular traffic, its passenger rolling-stock consisted of three double-bogie cars built on the well-wagon principle. This is a good idea, as it not only keeps a low centre of gravity, and enables the cars to keep the road better with restless passengers such as young children, but it also equalises out the weight on the two bogies, much better than a straight seat-board; passengers cannot sit right at the end, and put too much weight on one bogie, besides forcing one side of flanges hard against the rail head on a curve. These cars gave good service, but like all rolling-stock, in due course needed repairs; and it was then that our architect-engineer-cum-carriage-and-wagon designer hit on his bright idea, which, incidentally, anticipated a later American development in full-size practice.



Two Coach-ends on One Bogie

Probably every follower of these notes knows of the system of carriage articulation devised by the late Sir. H. N. Gresley, in which only the leading end of the first coach, and the trailing end of the last coach, had a bogie all to itself. The other ends, and the ends of each of the intermediate coaches, shared a bogie with its next-door-neighbour, said bogie providing moral and physical support to the two ends, by a special system of suspension which equalised out the load, and provided the necessary flexibility. Friend Adams thought this would be a good wheeze to apply to his rebuilt rolling-stock; but it wouldn't be him if he didn't do something in the simplifying and improving line, and he obtained his articulation by just leaving the carrying bogie as it was, cutting the leading bogie off the following car, and coupling the end of the car to the preceding one by a stirrup and pin.

Constructional Details

The first three cars mentioned above, were made with three-piece seat-boards, the centre part forming the well. This was attached to the two ends by hardwood spacers, as shown in the drawing, the whole issue being secured by coach-bolts through the lot. At first, this arrangement answered perfectly, the assembly being perfectly rigid; but in course of time, owing to the shrinkage of the wood, and the compression caused by passengers riding in the well, the latter began to drop, and the parallelism of the centre and end sections was upset, the ends tending to cant inwards, as shown by the dotted lines in Mr. Adams's drawing. This naturally threw out the even loading of the bogies, the weight coming on the inner side of the bogie pin; and the result was that the bogies began to run off the road at the slightest provocation, especially as the weight of the rider deflected the well. To counteract this, Mr. Adams made up some side stays, of 1-in. by ¼-in. flat mild-steel, which was bent to the angle shown in the drawing, and attached to each side of the seat-boards by 1½-in. wood-screws. These stays cured the sagging and bending trouble, and the well and ends remained parallel.

When the time came for overhauling the cars, it was then that our friend had his brainwave, and decided to make an articulated train. One bogie car was left in its original form, for coupling directly behind the engine, to carry the driver and one or two extra passengers; but the other two cars were converted into what Mr. Adams calls "single-bogie hook-on cars." The end without a bogie has no wooden spacer block, but in its place is a steel plate, screwed down to the seat-board, and having a hole in it for the coupling pin. The trailing ends of all the cars, double and single bogie, have a stout hanger or stirrup, made from 1-in. by ¼-in. mild-steel, attached to the underside of the end board by ¼-in. bolts. In the centre of this is a ½-in. pin, fitting the hole in the plate, and a nut is put on it when the cars are coupled up. As the steel plate is 3½ in. wide, and the hanger or stirrup made to suit, there is no fear of a "tip-up sideways," as the kiddies would say, the cars running steadily without derailing; but there is one wasp in the jampot, and that is, should a loaded car be following one that has nobody on it, there is a tendency for the latter to be tipped up in a fore-and-aft direction. This, however, is easily avoided by seeing that the passengers all ride together—"Pass well down the car, please!"

Mr. Adams nutted the pins to avoid accidental uncoupling if a car was inadvertently tipped up, but different folk have different fancies; I think I would have fixed the pin in the underside of the flat plate, and put the hole in the stirrup. The trailers could then have been hooked on in a similar manner to the early editions of children's toy trains. A cross hole could have been drilled in the bottom of the pin, and a split-pin poked through it if there should be any likelihood of a tip-up causing a "slip-coach" effect; but it doesn't matter a bean which way you go, as long as you get there!

The trailer cars have the reinforcing side plates, same as the driving car. The bogies are, of course, all the same, and the wheels run independently on the axles, to avoid slipping friction, as the Falls Grove line is a complete circle. Each one contains a large ball-bearing, and they have stood up to all the load so far put on them. As more seating accommodation is provided for the same number of bogies, as can be seen from the illustration, stronger springs have been provided. Alternatively, a third spring could be used, in between the other two. All cars, both driving and trailing, are provided with removable foot-boards; the hangers are bent up from 1-in. by ¼-in. mild-steel, and footboards, 3 ft. 6 in. long of 3-in. by ⅞-in. timber, bolted to them.

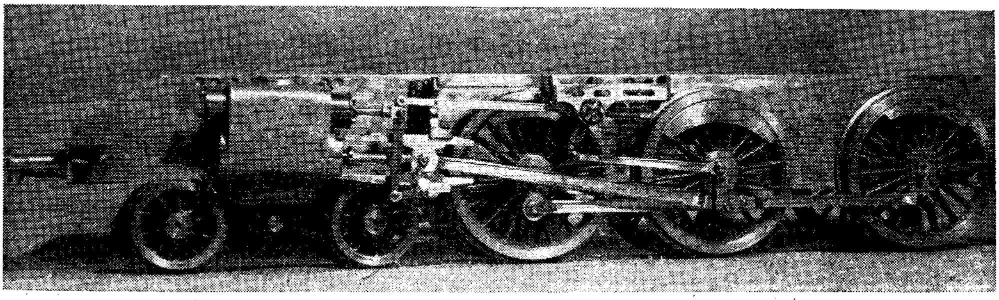
Great Minds Still Think Alike!

Curiously enough, just recently the technical Press has been describing what are called "futuristic" trains, built in America, "on an entirely new principle" (says they!) comprising 20-ft. coaches, each having a single bogie at the rear end, and being coupled up to the coach in front by what is virtually a glorified edition of our friend's wheeze. Mr Adams's daughter, Elizabeth Joy, who takes a great interest in anything appertaining to railways, says she would like the American engineers to tell her how the front end of the coach is supported, if they take one or two off, in order to shorten the train. Dad's solution is that the train never has to be shortened; but she won't accept that at any price! Anyway, the query doesn't arise with the Falls Grove articulated stock; it has given every satisfaction, keeps the road, rides well, carries the weight, and has been left outdoors in all weathers without any appreciable deterioration; so our friend commends the arrangement with all confidence, to brothers of the small railroad fraternity. If my own cars weren't all of different patterns, I think I would rig up one of the articulated outfits for my own road, for the benefit of the few personal friends who visit me at infrequent intervals, and bring locomotives for test.

Shall We Chance It?

My friendly dissertation on 5-in. gauge engines, in the issue of April 21st last, in which I called attention to the size, weight, and cost of a 5-in. gauge "Doris," and the equipment needed to

build her in the manner usually observed among the careful and competent members of our fraternity, has brought a considerable amount of correspondence. As, nowadays, I have not enough time available for detailed direct replies, maybe a few more words here and now, might not come amiss. Readers may recall that I mentioned the fact, that at first a big type of engine had been generally favoured for the 5-in. gauge "serial stories," and nobody at all had suggested a simple 0-4-0 or 0-6-0 tank engine. Well, I now hear that a 5-in. gauge edition of "Juliet" would have found favour; and several of our fraternity say that they would have welcomed an 0-6-0 with the same kind of "works." Incidentally, the number of 3½-in. gauge "Juliets" running around, must be amazing; all our advertisers who sell "approved" castings and materials, tell me they had quite a run on them when the drawings and notes first appeared, and even now, they are still selling.



Mr. L. J. Markwick's "Doris" progresses well

I also learn that there are actually some 5-in. gauge "Doris" engines under way, and the builders of same have eagerly seized on my offer to give details of suitable cylinders—"nothing but genuine 'Curly' cylinders will satisfy me," says one "unsolicited testimonial"! All sereny, we will see what can be done. One builder says that as he has a 6-in. lathe, big miller, and other machines of equal capacity, he started in on the 5-in. job right away—but he says I spoke truth about the size and weight of the engine. Referring to the difficulty of turning up the driving wheels for the "Maid of Kent" on the average small home-workshop lathe, I must confess to a No. 1 size in grins when I heard that more than one set of these castings have been machined up in full-size engineering works, as a bit of "buckshee overtime"; and I also confess that this was not exactly unexpected! As a matter of fact, it pays to "wink the other eye," in a manner of speaking, on certain occasions; in the little munition shop which I looked after during the latter part of the Kaiser's war, nothing was ever said, and no notice taken, of a little "homework." Production did not suffer in the slightest, and there was no abuse of privilege.

Those correspondents who preferred a different type of engine to the "Maid of Kent" and "Minx," need not be disappointed. Blueprints, castings, and materials are actually available for what is virtually a 5-in. gauge edition of "Juliet," to wit, Dick Simmonds's "Ajax." She differs from "Juliet" in details, the general layout being the combined efforts of Fred Stone and Dick Simmonds himself, inasmuch as she has outside Walschaerts gear, and other variations from the 3½-in. gauge engine; but the principles laid down for so long in these notes, have all been faithfully followed, and the net result is a simple, sturdy, and powerful little engine. The experimental one was tried out on my long supplementary straight road, and came up to expectations; it also performed on several club tracks, hauling big loads with the minimum of effort, and needing little attention. The wheelbase being so short, it could be operated around curves that the average engine wouldn't look at, and is ideal for continuous running on a back-garden line. All the machining and fitting instructions given in these notes for other engines, can be applied to the building of an engine of this kind, and no difficulty at all should be experienced.

Those who required a six-coupled outside-cylinder engine, to my specifications, could build one of the "Reevesco Twins," both of which were designed by Roy Donaldson, incorporating components described in these notes, and having some unique features. On a recent visit to Ashford, I had the pleasure of seeing the original drawings of both the engines. "Gert" is a six-wheels-coupled outside-cylinder tank engine of what might be called "standard pattern," of simple and robust construction, and has no fallals or unnecessary trimmings whatever. She will stand up to all the rough usage and knocking about that an engine of this type would get in full-size practice, when doing short passenger or goods hauls, and shunting. Having the same size cylinders as the "Maid" and "Minx"—the cylinders are the same as those specified for an outside-cylinder "Maid"—and smaller wheels, with the whole weight of the engine available for adhesion, she would shift an enormous load with little effort. In view of the wretched stuff dished out by the Coal Board for home consumption, friend Donaldson has ingeniously adapted a wide-firebox boiler to the engine, the wrapper spreading out, and the foundation ring extending beyond the frames; the inside sheets of the side tanks are sloped to suit, and nobody would guess, from the outside appearance, that the engine carried this type of boiler. The central part of the grate is made to

dump into the ashpan, so that the firebox can readily be cleared of all residue after a run. Provision is made for high-temperature superheat, so that the engine ought to steam on " tarmac and granite chips," as the enginemen would say.

If an outside Walschaerts valve-gear is made extra strong, to stand up to the hard wear and rough usage that a willing worker usually gets, the parts become clumsy and unsightly. To obviate this, " Gert " is provided with Stephenson link motion, which can be made as strong and stout as the builder wishes. An inside valve-gear is also less liable to damage from collision or derailment, than an outside ditto. Another advantage is the automatic advance given to the valves by link motion, when the engine is running fast on a continuous line, and well notched up. The small wheels would turn pretty fast ; and for the utmost efficiency, both admission and exhaust should open good and early. The boiler is fed by one pump and one injector, and the boiler fittings and mountings are the same as specified for " Maid " and " Minx."

Railways of 3-ft. 6-in. gauge usually have locomotives with the same general proportions as those on the 4-ft. 8½-in. gauge ; in South Africa, for example, some of the engines are bigger than those in this country. Bearing this fact in mind, Mr. Donaldson arranged " Gert's " twin sister " Daisy " as an equivalent 3-ft. 6-in. gauge edition of the same type of engine as represented by " Gert," so that " Daisy " is practically identical, except that the frames are closed in, and the axles shortened, to enable the engine to run on a 3½-in. gauge line. She could be made to take sharp curves easily, by the simple expedient of turning the flanges off the middle pair of wheels. Therefore, if any owner of a 3½-in. gauge road wants a simple but powerful 0-6-0 tank locomotive that looks good, steams well, able to pull the Eddystone Lighthouse up by the roots and run like a deer with it, and above all easily, quickly, and comparatively cheaply built, he should lose no time in making a date with " Daisy." Our Southern Region friend has written a booklet containing a summary of instructions for building " Gert " and " Daisy," which would be mighty handy to new readers, and also a memory-refresher to older ones, who took a fancy to either of the " Reevesco Twins." The above information should be of interest to those who wrote and suggested a quick-fire description of either an 0-4-0 or 0-6-0 engine, to follow " Maid " and " Minx."

" Maisie " Grows to " Teen-age-size "

Just one other item. A suggestion from several correspondents—great minds still think alike, as I mentioned before—was that I should split the difference in a manner of speaking, between a simple tank, and a 4-6-2 like the " Duchess of Ditchwater," and give a few ' ints and tipses on a simple straightforward 5-in. gauge Atlantic. Arguments in favour of this, as opposed to a 5-in. gauge " Doris" or G.W.R. engine, were that the boiler, for one thing, would be far easier to make than the taper-barrel-Belpaire-firebox type ; and with side play on the trailing axle, the engine would be more flexible than a 4-6-0. I was also gently reminded of the great popularity of the 3½-in. gauge " Maisie " described in these notes many moons ago.

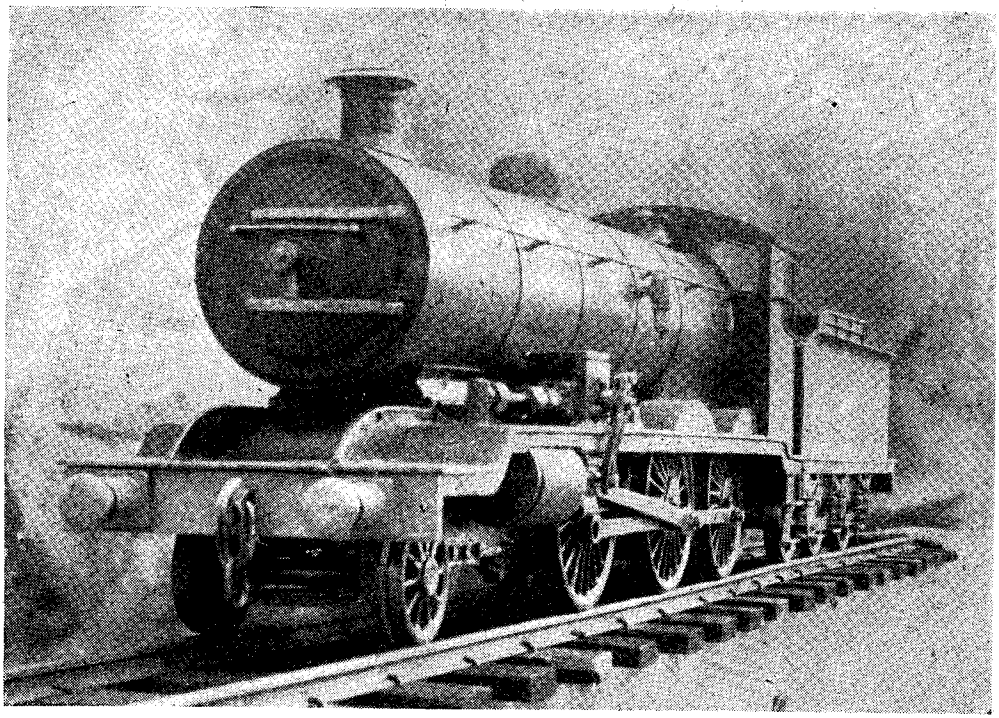
Well, strange to relate, an order for a locomotive of this type was placed with Dick Simmonds not so very long ago, and she is now under construction. She is virtually " Maisie " grown just a little bigger, the original drawings being enlarged ; but she will have a much higher superheat temperature, and various improvements in detail, in accordance with progress made since the original " Maisie " was built. No special drawings have been made for the 5-in. gauge job so far ; but they could easily be supplied in the event of any call for them. All castings could, of course, be supplied from the special patterns made for the job in hand. Except for a few suggestions regarding the description of certain accessories in detail, which I have duly noted, I fancy that clears up the points raised about 5-in. gauge engines ; but the question put, sometimes as a P.S., by nearly every correspondent was—

What About the Next " Serial " ?

As the tales of " Maid of Kent," " Minx " and " Doris " draw to their end, readers say it is about time we started deciding on the next one, with kind approval of the Knight of the Blue Pencil ; incidentally, nobody paused to think whether my nearly-worn-out noddle would stand the racket—they just take it for granted ! Anyway, I appreciate not only their confidence, but their kind comments on my past notes. I can tell you one thing, however—I'm not running four engines " in parallel " any more ; it's a wonder we didn't have a glorious old pitch-in, with three of them in this journal, and another in a friendly contemporary.

To be perfectly frank, I had hopes that the design for the new standard express locomotive for British Railways would have been made public by the time the current serials were completed ; and had that been so, I intended to ask the C.M.E. of British Railways, Mr. R. A. Riddles, whether he had any objection to my describing how to build a 3½-in. gauge edition of it, before the first big sister left the shops. I guess this would have been as popular a job as " Hielan' Lassie." It has been done before ; Carson's had a 3½-in. gauge " Great Bear " running (Teddy Bear ?) before the full-size one left the Swindon locomotive factory. Up to the time of writing, I have seen no drawings of the B.R. engine ; but I have heard certain things that lead me to believe that I assumed " Elijah's mantle " to some purpose, and a few good folk are in for a mighty shock ! Be that as it may, a 3½-in. B.R. " standard " locomotive is definitely " off " for the time being, so we must fall back on readers' suggestions.

Among those asked for (all in 3½-in. gauge) were a four-cylinder G.W. " Castle," of the latest type with high superheat and mechanical lubrication ; loud cheers from the K.B.P.—I'll bet a month's meat ration that he wouldn't B.P. that suggestion ! A four-cylinder Chapelon compound, 4-6-2 or 4-8-0, as running on the French National Railways, complete with all the blobs and gadgets. Incidentally, I don't believe there are more than half-a-dozen people in this country who know



Mr. G. Morgan's "Brighton Mogul"

the *true* valve-setting of these engines. A 100 per cent. American engine, such as a New York Central "Hudson," or a Pennsy 4-8-2. A Southern "Flannel Jacket" rebuilt as a proper good-looking engine, minus all the outer tinware, the chain drives, and the other unlocomotivelike appurtenances—the "spam out of the can"; this would be an interesting job. One of the Fowler (L.M.S.) or Maunsell (Southern) engines that were designed but never built; another very intriguing suggestion. A L.N.E.R. 2-6-4 tank of the "L1" class; powerful outfit, that. As a memory of a "successful failure," the old Great Eastern "Decapod" 0-10-0 tank. The engine was all right, but the permanent way and bridges wouldn't carry her. Also another "Remembrance"—literally—the L.B. & S.C.R. "Baltic" tank which bore that name.

The above would all be "Bill Massive" jobs. At the other end of the scale, the old-timer's section, the suggestions included a "Caley" 4-4-0; Highland 4-6-0 with slotted chimney; the ever-green Stirling eight-footer; Midland single-wheeler "Princess of Wales" (a real locomotive lovely, that); Wainwright's S.E. & C.R. 4-4-0 in all her glory of polished brass and copper (another lovely); old "Grosvenor" (loud cheers from "Curly") and going farther back still, the L.N.W.R. "Cornwall," with her driving wheels as high as the top of the boiler, and an old Crampton, the type of engine in which the designer forgot that she wanted a pair of driving wheels until she was nearly finished, and then hung them on behind the firebox, so unofficial history tells us—but, boy, *couldn't* they hop! Anyway, there are a few suggestions, as received to date; any more to come, glad of them. It's your call!

A "Crimson Rambler"

(*Continued from page* 704)

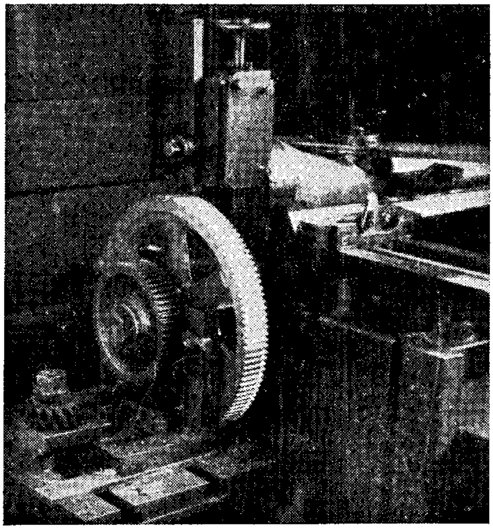
and forty engines have been the most successful compounds ever used in Britain, and they have done an enormous amount of good work, especially in the southern area of Scotland.

However, their withdrawal for scrapping has begun, since they are no longer capable of dealing with the demands of modern express passenger traffic of the heavy kind. Nevertheless, there is still much fast traffic of the lighter kind on which these engines can be usefully employed, so that their total extinction may yet be deferred for some years.

No. 1051 began her career on the Midland Division, but a year or two later was transferred to the Western Division where, for some years, she was one of a number successfully employed on Euston-Birmingham 2-hour expresses. We believe she is now back on the Midland Division, though her duties are much less onerous than they were.

Cutting a 120 Change-Wheel

by J. W. Hopkins

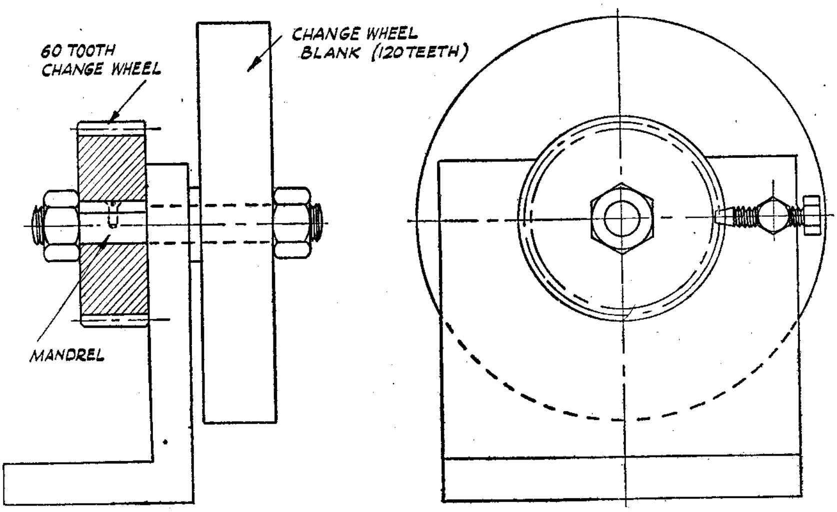


HAVING bought a Zimmerman-Werke lathe with the 120 change-wheel missing, the following method was employed to provide a new wheel.

The blank consisted of a casting, which was first set in a four-jaw chuck, and faced and turned halfway across the peripheral diameter. It was then reversed and the other side was faced. The centre hole was bored and machined to diameter (8.405 in.) and the keyway cut on the same setting. The next step was to fit the blank on to a mandrel, turn all over and mark a centre-line. Another screwed mandrel was then turned up, with a shoulder and keyway, and a hole was bored in an angle bracket to take the screwed mandrel. The blank was secured to this, a 60 change-wheel slipped on and keyed and the nut tightened up. An indexing screw was next fitted to the side, the point having been turned to the same contour as the tooth of the 60 wheel.

Now two tools were ground; one a parting tool to the width of the bottom of the teeth, and the other to the shape of the teeth. The bottoming tool was then set to a centre-line previously scribed in the lathe, and each tooth was roughed out around the entire diameter of the blank. This was followed by finishing cuts, using the form tool.

Following these operations, the 120 wheel was rotated half the tooth pitch, bringing the tool to centre between the teeth already cut and the former procedure repeated. Here a careful check was made with a template specially cut to represent the pitch for 120 teeth. All work, except the turning, was carried out on a 7 in. stroke heavy type shaper.



A Variable-Speed Gear

A Novel Application of the "1831" Transmission Gear

by J. Rodway, A.M.I.Mech.E.

DURING the autumn of 1942 when this country was furiously making all forms of engines of war, there arose many engineering problems—great and small—which just had to be solved, and solved quickly.

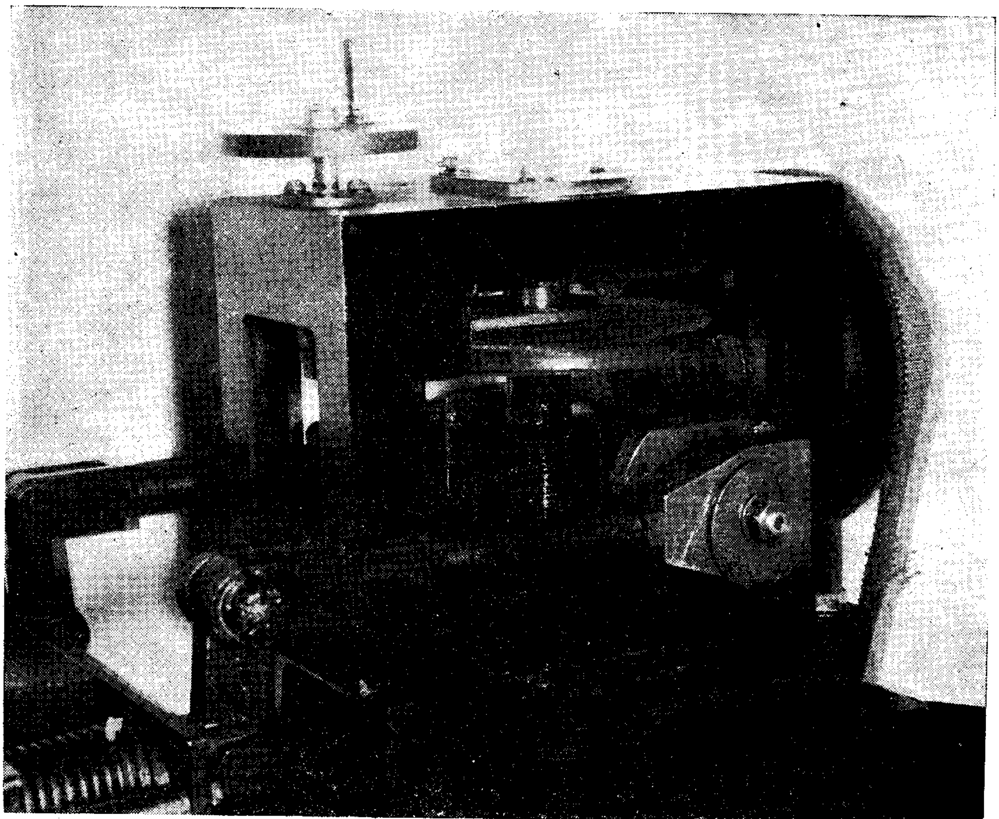
This is the story of how the "1831" transmission gear, the design of which was published in THE MODEL ENGINEER in May and June of that year, solved one of the small problems and led to a device which has been of great use ever since.

The problem concerned the testing of certain air-valves and allied apparatus then used for the control of steering and braking on some of the English-built tanks. It was necessary to operate a number of these air-valves at frequently repeated intervals and in a certain sequence to establish data concerning reliability and rate of wear under various sets of conditions. The rate of operation had to be varied readily to suit conditions, and, moreover, had to be varied over a wide range.

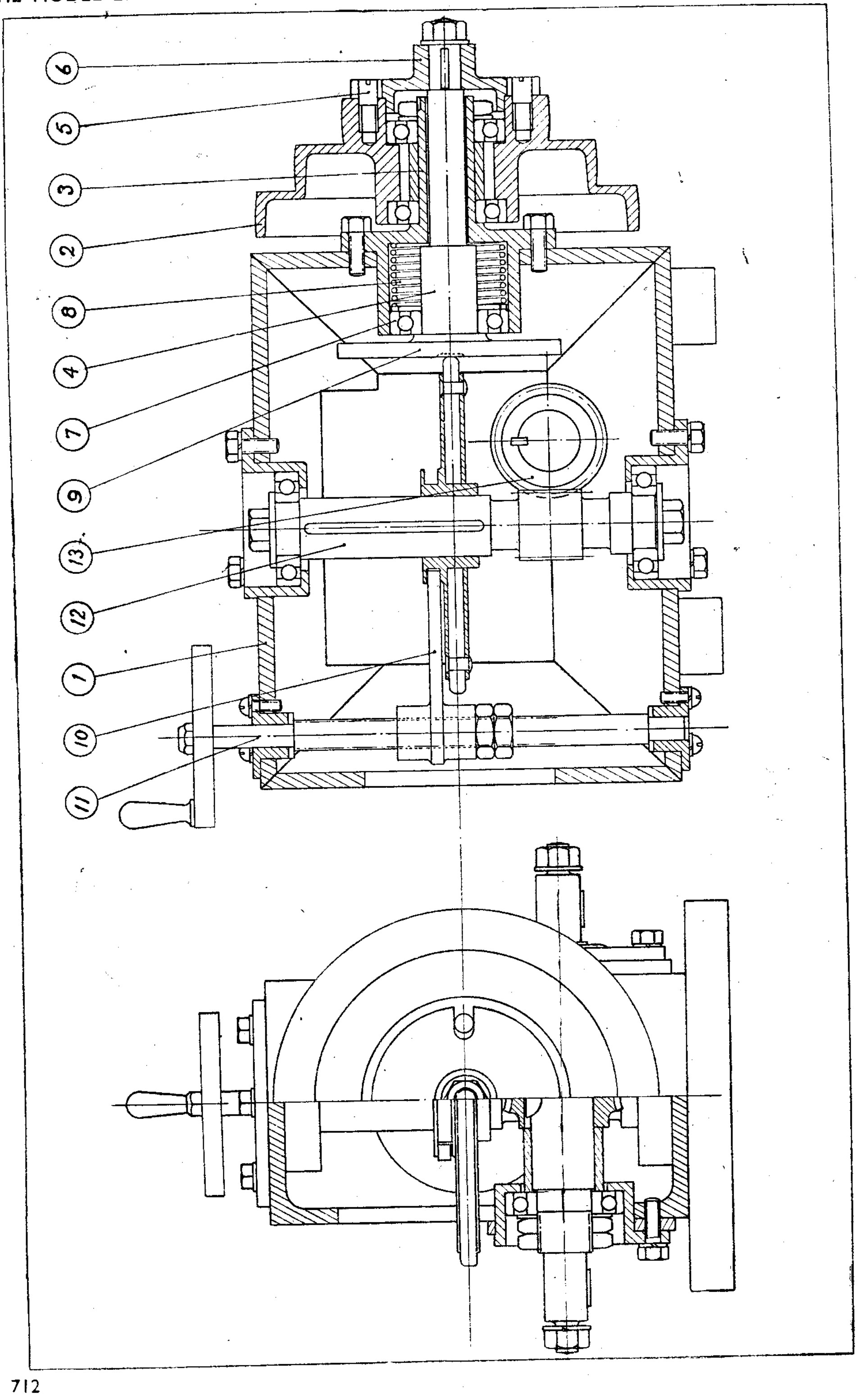
Casting around for ideas for the variable-speed driving mechanism, it was soon established that a variable-speed motor was not readily available, nor, if available, would the speed range be sufficient.

Recollection suddenly flashed to the "1831" variable transmission, and an investigation of the pages of THE MODEL ENGINEER soon showed that here lay a solution.

The speed range possible with the "1831" gear was barely sufficient but it was realised that



The "Timing Drive" variable speed gear, showing friction wheels and eccentric operating-valves under test



General arrangement of " Timing Drive " unit

a cone pulley added to the input shaft would extend the range as required. Time, naturally scarce, prevented any trials being made, hence it was decided to copy as far as possible the detail design of the "1831" gear, build a similar unit into a simple frame and add the cone pulley for motor drive.

The output, at a slow speed, included eccentrics from which actuating-rods operated the air-valves as required. The general design of the unit as constructed is illustrated in the reproduced drawing, and apart from larger bearings which were available, whereas the specified size were not, the design will be seen to include all the fundamentals of the "1831" gear. As reversing was not required, the friction disc was arranged to move only over one side of the friction wheel.

Referring to the drawing, (1) shows the main casing built up from sections of channel iron welded into a box form and machined over the outside. Note, this only entailed simple milling and yet gave a true and robust basis for the remaining construction.

The input pulley (2) is carried on two bearings supported in the conventional manner by the extended bushing (3). The belt loading is thus not transmitted to the friction-wheel shaft (4) but the drive is transmitted by two pegs (5) engaging with slots in the driving cap (6). This driving cap is rigidly mounted on the friction-wheel spindle but is slidably spigoted into the end of the pulley bearing bore. Thus the spigot provides the second point of support of the friction-wheel shaft (4), the first point being the ball-race (7).

Ball-race (7) is a close-sliding fit in the bushing (3) and is urged to the left by the spring (8) which provides the load between the friction-wheels. Ball-race (7) is of the type which has no filling slot and is thus suitable for a moderate amount of end-thrust. The friction-wheel itself (9) is made of mild-steel and had the face ground to run quite truly. The friction-disc was originally made of bakelite composition, but this was the only item found unsatisfactory and was changed to a disc of chrome tanned leather.

As in the original design, the friction-disc slides along its shaft and drives through a feather key, movement of the position being governed by a steel striker (10) engaging a groove in the friction-disc mounting bush. The striker position in turn is governed by the screw (11) which passes through the tapped boss of the striker-arm and is provided with a hand wheel for adjustment of the speed ratio. The photograph shows a piece of wire attached to this hand wheel, as after many years of operation a tendency to vibrate out of position has become manifest.

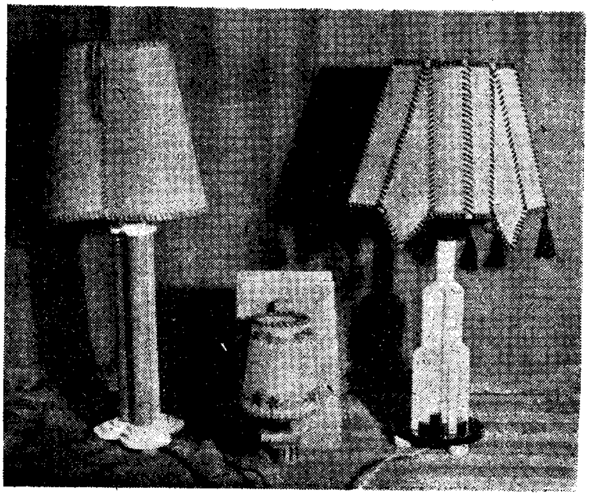
The shaft (12), carrying the friction-disc, is furnished with a worm engaging a wheel on the output shaft (13) and in the photograph can be seen the eccentrics and rods for operating the air-valves.

The "timing drive," as it is called, was put to work driving various units for test in the autumn of 1942 and is still in regular use. The ability to operate all kinds of devices at regular and easily adjusted speeds is particularly valuable in experimental work, and the device has become a familiar and much used item of plant in the experimental department.

Lest there be any who feel a friction drive is of doubtful reliability, the records of the work done by this drive should be of interest. The motor is $\frac{1}{4}$ h.p., 960 r.p.m., and the extreme ranges of the output speed are from approximately 10 r.p.m. to 200 r.p.m. The average torque at the output shaft—determined by the valves being operated—is only low, but the unit has been operating, in all, approximately 4,200 hours under workshop conditions and with only occasional lubrication. It has also operated successfully for testing in temperatures as low as -40 deg. F., i.e., 72 deg. of frost! The friction-disc, apart from the change to leather mentioned above—has never been renewed.

Plastic Materials

We are constantly receiving enquiries from our readers regarding the supply of plastic materials of a suitable nature for machining and fabrication in the home workshop. Messrs. R. A. Girdlestone, of 15, St. Nicholas Street, Ipswich, have forwarded us photographs of articles manufactured from "Perspex," "Catalin" and "Crinothene," and inform us that they hold stocks of these materials in various colours, opaque and transparent.



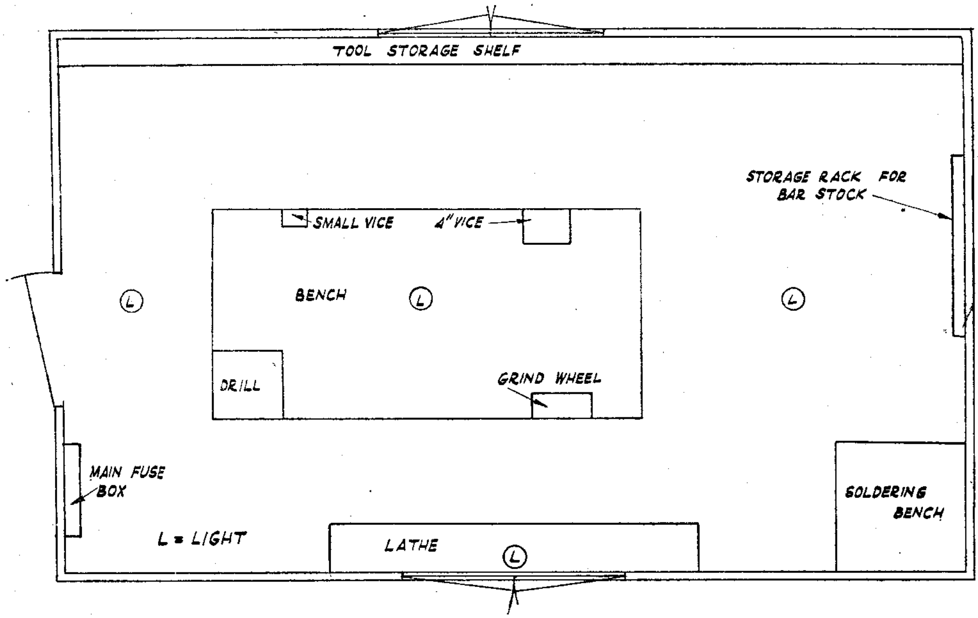
They can also supply the appropriate cements and polishes for these materials.

The specimens of work shown in the photograph are of an ornamental character, but there are many other ways in which plastics can be applied, to facilitate construction and increase realism in engineering models.

SETTING UP SHOP

by D. Blackhurst

IT is now just over two years since I commenced to set up my workshop, and needless to say I have not yet finished the job to my satisfaction; but then, I have never met anyone who has completed the task, as one can add to a workshop for ages and never really finish it, unless backed by unlimited financial resources. I offer these notes to the beginner who is about to set up in model engineering, in the hope that they may be of some use to him.



The layout of the workshop

Location of the Workshop

The first essential is, of course, the shop itself, and this is largely governed by the domestic situation. The ideal shop is situated away from the house in a building of its own, but if this is not possible then any room will suffice, although a downstairs room is to be preferred. In the older type of house, attic workshops can be excellent, but their use in the smaller modern house is usually ruled out, owing to the lack of light and the small manhole which is provided. In using an upstairs room it is advisable to seek the help of the builder in deciding what weight the floor joists will carry. If the allotted room has also be to used as a living room, it is best to construct the workshop in the form of a cupboard with the front section hinged at its lower edge to form a covering for the carpet. From time to time some very compact workshops have been described in this magazine; one recently described was constructed in a roll top desk and I was impressed by the amount of equipment that had been arranged in this small space. As regards to the use of cellars, their main drawback is their dampness, and I have heard of no really successful method of overcoming this disadvantage.

We now come to the more general type of workshop situated in a garage or shed. Personally I prefer a wooden building to a brick one, together with a wooden floor, as I have always found them to be warmer to the feet. The ideal floor is wood laid on a concrete foundation. As for the size of shop, this again is largely a matter of making do with the available accommodation, but the usual type of garage is an excellent size for most needs, although I would suggest the fitting of another window if the garage is equipped with one window on one side only, as most of them seem to be. As for lighting, I consider two 60-W lamps ample for an area of about 12 ft. × 20 ft., provided that they are supplemented by additional lights over such items as the lathe, drilling machine, etc.

The Bench

We must next turn our attention to the fittings, the foremost of these being the bench. My own bench consists of a 2-in. wood top on 4 in. × 4 in. legs, and I find this preferable to a metal bench as it gives more rigidity. As for size, it is 3 ft. ×

6 ft., and is built so that the top of the vice is level with the elbow. For added rigidity the bench should be bolted to the floor using rag bolts if fixed to a concrete floor. The best position for the bench is in the middle of the shop with a working space of about 4 ft. between it and the wall on one side at least. On the bench itself should be bolted an engineer's vice, with 4-in. jaws, at one end and a smaller vice at the other. I have also fitted my bench with a 1-in. jeweller's vice and I find this extremely useful for small work. On the other side of the bench I would suggest a $\frac{1}{2}$-in. drilling machine of either the hand or electric type, depending on the funds available. Another necessity is a bench grind wheel and polishing head, and I have also found a small anvil has more than repaid its original cost. In the centre of the bench is fitted an electric light of the universal joint type with an arm long enough to reach anywhere over the bench. A large cupboard underneath takes care of the more valuable tools, such as marking-out tools, etc., and in my case I have a small electric fire element in the cupboard as part of the unceasing war against rust.

Soldering and Brazing

All the soldering and brazing work is done on a small bench 2 ft. × 2 ft., fitted in one corner and constructed of angle iron, with an asbestos covered wooden top. Owing to the difficulty of having gas laid on, I am at the present moment experimenting with "Calor" gas, which is readily obtainable in cylinders fairly cheaply. As this gas is used under exacting conditions on many small yachts, I can see no reason why it should not be ideal for the workshop. An electric socket with a switch and warning light are situated on the wall over the bench and two lengths of 1-in. conduit about 9 in. long, fitted to the bench legs at an angle, take care of the soldering irons.

The Lathe

Our next major item of equipment is the lathe, and the only advice I intend offering to the beginner is to purchase the best that he can afford. The ideal position for the lathe is directly under the window and an electric light should be fitted. With the stand type lathes there is usually a storage rack underneath for accessories, but with the bench type it is advisable to construct a large cupboard under the bench to contain all the various tools.

Tool Storage

I personally devote the whole of one wall to tool storage and in this respect I was recently fortunate in purchasing an ex-government valve box consisting of 49 compartments, each 2 in. × 2 in. × 6 in. I have fixed this to the wall and find it invaluable for the storage of small tools. Along the whole of one side I have also fitted a 6-in. shelf with 1 in. × $\frac{1}{4}$ in. notches every inch for the storage of such hand tools as files, etc. I have one set each of number and fractional twist drills and I have fixed the drill bases on to a steel arm which is pivoted about the centre of the bench. Larger items and precision tools are stored in the bench cupboard already described.

In the diagram on page 714 is a plan view of the workshop and I might add that I have tried many variations of this layout, but I find the one given to be the most suitable for model work.

Stock

On the end wall I have fitted a series of dowel pegs and here I store all my bar and rod stock with miscellaneous metal stored in a large steel box, of which I have three, the other two being used for electrical and mechanical components respectively. For the storage of nuts, bolts, rivets and similar small items I obtained a quantity of screw-top glass jars and I fitted the lids to the workshop roof. With this method the nuts and bolts can be readily seen and are easily accessible.

An insulated plastic board on one wall is equipped with a fusebox and a main switch, and also a bulb worked off a battery which is extremely useful in the case of a blown fuse. The workshop is also equipped with a car type fire extinguisher and a first-aid box.

These notes were not intended for our old hands, but I sincerely hope that they will be of some use to the younger fraternity about to enter the model engineering world.

Tonbridge Society's First Exhibition

The Social Centre, Lyons Crescent, Tonbridge, was the scene recently of the first exhibition organised by the Tonbridge Model Engineering Society. It was a very good show and seemed to contain something to interest everybody, and the general standard of workmanship in all sections was high.

The Competition section was, perhaps, the principal feature and contained upwards of fifty exhibits divided among seven different classes and covering almost every type of model.

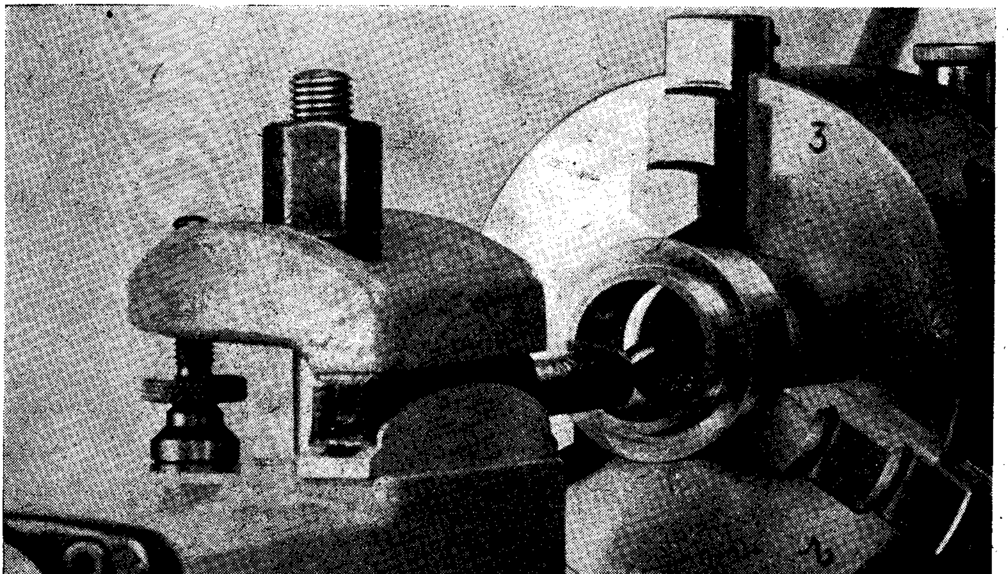
The Chairman of the Tonbridge Urban District Council, Councillor A. Alvey, performed the opening ceremony, and the society is to be congratulated upon a notable first effort of this kind. We were impressed by the happy, friendly atmosphere which seemed to pervade the show. There can be little doubt that many of the visitors were surprised by what they saw, and to them, as usual, one of the chief attractions was the $3\frac{1}{2}$-in. and 5-in. gauge passenger-carrying track erected out in the open alongside the hall. We feel that model engineering is now well and truly "on the map" in Tonbridge.

The Myford Quick-Setting Lathe Tool

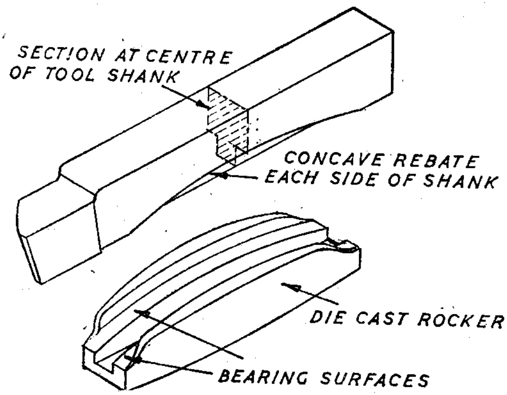
A set of lathe tools with packing-piece

AN ingenious form of lathe tool has recently been introduced by the Myford Engineering Co. Ltd., of Beeston, Notts, with the object of facilitating the setting of the tool point to correct height, and eliminating the need for packing under the tool, in all but very extreme cases. While designed principally for use on the Myford ML7 lathe, it is applicable to practically all types of lathes, except those with special forms of toolposts; it entails no alteration whatever to the structure of the toolpost, and it can be interchanged or used in alternation with existing tools, with no more delay than is normally involved in ordinary tool changing.

The illustrations of the device are largely self-explanatory, and it will be seen that its principle of operation is extremely simple, utilising the familiar "crescent" packing-piece or rocker, as employed in the lantern form of toolpost, but in reverse, and in conjunction with a special formation of the tool shank itself. The packing-piece itself is a die-casting, roughly of channel section, with side cheeks forming a guide for locating the sides of the tool, and inner ridges of convex form which act as the bearing surface for the tool, the underside of which has concave rebates milled in both edges, to an arc which matches that of the ridges in the packing-piece.



One of the tools in operation, showing also the new type of clamp-plate and jack-screw



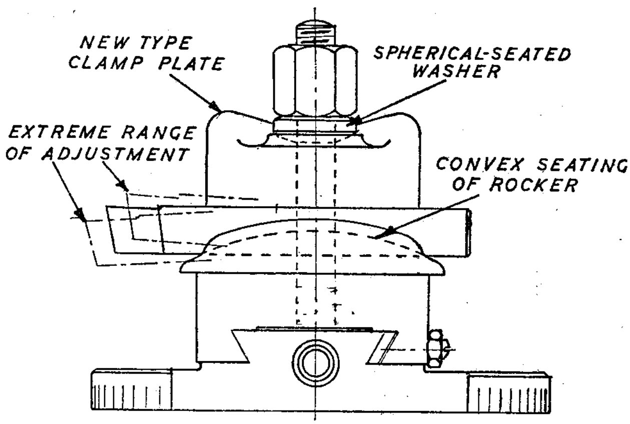
Lathe tool, rebated on underside, with special packing-piece

It will thus be clear that when the tool is resting on the packing-piece, any relative endwise movement of the parts will result in a rocking action which tilts the top of the tool upwards or downwards, according to whether it is moved backwards or forwards. When clamped down by the toolpost clamping-plate in the normal way, the adjustment is firmly locked and cannot be altered by the cutting pressure on the tool.

This tool combines the facility of adjustment of the "American" type toolpost, with the adaptability and rigidity of the openside clamp-plate type. It will be noted that it is necessary to provide for some latitude of tilting movement of the clamp-plate itself, so that it beds down on the tool for its full length. This is already provided for in Myford ML7 lathes (and some of the later ML4's) by forming a spherical recess in the clamp-plate, and fitting a spherical-faced washer under the nut, but in the absence of such an arrangement the plate and the stud may become unduly strained if clamped down out of square.

A new form of clamp-plate has recently been introduced on the ML7 lathe, which is not only much stronger to resist clamping pressure than the plain flat type, but also provides for a wide range of tilting movement. In addition to the spherical washer and seating, it has a self-aligning pad on the jack-screw which is used for adjusting the height of the heel of the clamp-plate; this fitting can clearly be seen in one of the photographs.

Sets of tools to cover all normal turning operations, with ½-in. square shanks machined to fit the special packing-piece, are now available. The tools in the standard set are of the butt-welded type, with cutting edges of superior grade high-speed steel, but carbide-tipped tools can be supplied to order. Tests of the tools have proved that there is no lack of rigidity, and much time is saved in tool setting by the elimination of packing. The die-cast packing-piece stand up well to the clamping pressure and as it is not subjected to bending, tension or shear stress, or to rubbing friction, it may be expected to last indefinitely.



End view of slide rest, showing range of tool height adjustment obtainable

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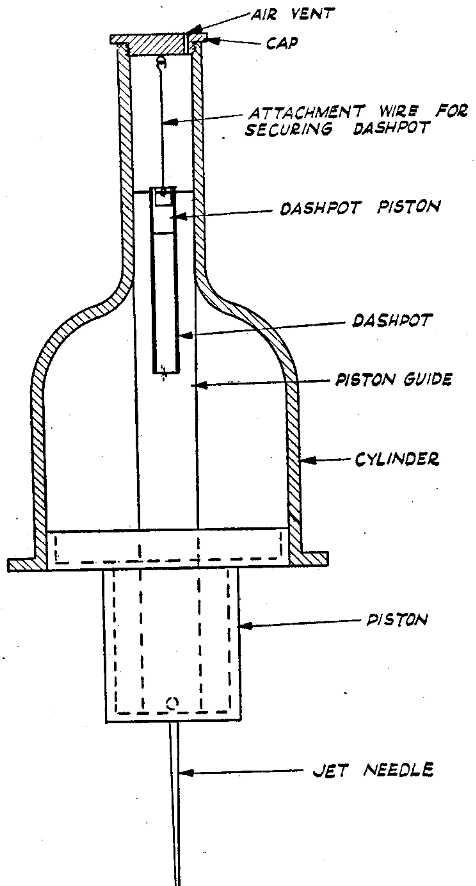
The Correct Use of Hacksaws

MESSRS. JAMES NEILL & CO. (SHEFFIELD) LTD., the makers of the well-known "Eclipse" hacksaws and other tools, have sent us a copy of a leaflet entitled "Sawing Problems Solved," which contains some very useful information on the use of hacksaw blades, to obtain the best efficiency and economy in dealing with various kinds of work. Copies of this leaflet are available from the above address, or from "Eclipse" tool stockists.

PRACTICAL LETTERS

Carburettor Details

DEAR SIR,—I have read with interest the article "In Quest of Speed" by Mr. S. H. Clifford, in THE MODEL ENGINEER of March 5th, and would like to make known to him a method of correcting the piston flutter on his S.U. type carburettor.



On the latest S.U. there is a hole down the centre of the piston guide. Suspended by a wire hook from the cap of the bore in which the guide slides is a small piston. This arrangement acts as an oil dashpot in which thin oil is used. The dashpot gives smooth, but not delayed, acceleration and, I think, would prevent piston flutter after experimenting with different piston clearances, and oil viscosities in the dashpot.

Yours faithfully,

Hornsea. GEORGE SUMNER.

Small Garden Railways

DEAR SIR,—The frequent recurrence of the question "Minimum Curves" would point to considerable demand for a continuous track, in the limited space usually provided by the average suburban back garden. My own experience may be of assistance to those who desire to drive a locomotive of their own construction around a very restricted track.

The gauge of my line is 5 in., and it is oval in shape, being merely two halves of a circle with a 6-ft. straight at either side.

The radius of the curves is 10 ft. 4½ in. to the outer rail, and there is no transition.

A super-elevation of ½ in. is given, and most important, the track is laid at or near ground level. The passenger trucks run on two bogies, and although the seat board is raised no more than 7 in., I and many others find the riding position no more irksome than the usual straddle seat on an elevated track.

The locomotives, two in number, were both constructed with due regard to the severity of the track curvature. The first is a 0-6-0 tank locomotive, similar to "Twin Sisters" with wheels 4 in. diameter, and a total wheelbase of 11 in.

The treads are ⅜ in. wide and flanges ⅛ in. deep, so are in no way abnormal for a 5-in. gauge engine.

Engine No. 2 is a more ambitious effort, being a 2-6-0 with three cylinders and with 5 in. diameter driving wheels. The fixed wheelbase is 12½ in. plus the pony truck 8 in.

The tender to this engine is designed for the driver to sit on, and in order to negotiate the track, is mounted on a four-wheel bogie and a two-wheel pony truck, concealed behind the conventional side frames.

Both locomotives will run continuously round my track without undue stress, although I find it advantageous to oil the outer rail.

Now as to speeds—the tank engine has been timed to do 20 laps with two adults up in under 4 minutes, which averages something near 4½ m.p.h.—quite fast enought for a thrill, so take heart, brothers with small gardens!

Yours faithfully,

Manchester. H. GARSIDE.

Southampton "Ploughing" Engines

DEAR SIR,—"Civil" has certainly given us a fine picture of Fowler 16719; the crane, of course, is an addition, but the lugs on the hind wheels show clearly the absence of the original widening rings to which I referred in my letter published on October 14th. 16719-20 are probably the largest ploughing engines in this country: approximate cylinder dimensions are 8¾ in. and 14 in. by 14 in. Does any reader know the size of Nos. 16491-2, recently converted to portables at Barking? These are believed to be of the largest type ever built by Fowlers.

Yours faithfully,

Ruardean. R. C. STEBBING.

Ploughing Engines

DEAR SIR,—As one who takes a great interest in traction engines. I have read recent comments in THE MODEL ENGINEER anent these engines being used at the present time for dredging work on the South Coast. You may be interested to learn that a fine pair of Fowler Compound Steam Ploughing Engines are in daily use—not for ploughing, however—at Highfields, Woodlands, which is about 3½ miles north of Doncaster, and adjoining the Great North Road, A.1. These engines, in fine mechanical condition (with registration numbers prefixed "BD" which is the Northamptonshire County Council Authority), are now presumably the property of the National Coal Board; the engines are occupied on the "never ending job" of dredging, with dragline apparatus, the coal dust "slurry" or "settlings" from a coal washery plant attached to Brodsworth Colliery—one of the largest in South Yorkshire—the washer is situated about three-quarters of a mile "upstream" from where the engines are being used in a pleasantly wooded ravine. The effluvium from the washery, flows down the ravine, interrupted by suitable "dams." The solids in the outflow settle in beds thus formed, to be scooped out with apparatus operated by the above engines.

Stacks of this combustible stuff are piled on the banks to dry, some is then transported back to the colliery to be fired in Lancashire type boilers, thus providing steam power for operating colliery plant, etc.

To my mind, this is a logical state of affairs, for not only is the washery waste used for power at the colliery, but also used along with a little solid coal to fire the ploughing engines. Contrast this with the practice so often found, of using "oil fuel" extensively in handling and transporting coal, particularly at "opencast" workings.

To those who feel that "steam" is far from being "played out" in this country, it is nowadays a pleasure to see such engines at work, and well cared for. Interested motorists using the Great North Road in the Doncaster area, should pull up nearly opposite "The Broad Highway Hotel" and peep over the wall into the woods where the engines may be seen close at hand.

Yours faithfully,
Bradford. W. D. HOLLINGS.

A New Free Pendulum Escapement

DEAR SIR,—After considering Mr. A. R. Turpin's interesting article on the above subject in the issue for April 28th, it occurred to me that his design could be considerably simplified.

If the centre row of short pegs is omitted, the escape wheel can be fabricated from two sheet metal discs rather in the form of a large toothed chain sprocket. The pallet can be returned to the locking position by a counterbalance weight or a leaf spring, light enough to be overcome by the weight of the ball.

If the longer pallet pin is bent at right-angles just before the locking face, it will clear the unlocked escape wheel tooth, when the weight of the ball is lifted from the shorter pallet pin.

Banking pins will be necessary to limit the travel of the pallet.

Yours faithfully,
Anglesey. J. A. C. HOOD.

CLUB ANNOUNCEMENTS

The Society of Model and Experimental Engineers

On Saturday, June 18th, at Caxton Hall, Mr. A. L. Hutton will give a lecture on the "Walschaerts Gear." Those who have already attended a lecture by Mr. Hutton will know that he will deal with the subject in a way which will be acceptable to novice and expert alike. Non-members wishing to attend may obtain a card of admission upon application to the Hon. Secretary, A. B. STORRAR, 67, Station Road, West Wickham, Kent.

Plymouth and District Society of Model and Experimental Engineers

Although our society has not been much "in the news" lately, we are far from lying dormant. After long and painful searching, we have at last secured a site for the erection of our hut, and a licence for its erection secured. Several volunteer helpers have worked hard on the site (at Stoke, Devonport) and it is hoped that the premises will be ready for permanent use in the near future.

Meetings have, of course, been held regularly every month, and lectures this year have included: "The Tribulations of a Model Engineer," by Mr. C. W. Nye; "Drilling Holes in Metals," by Mr. D. Perkins; "Railways of Great Britain" (a lantern lecture), by Mr. D. Viney, of British Railways; and "Starting the Cult of Light Engineering," by Mr. W. R. Dunn. These meetings have all been well attended, as have also the monthly steam section meetings, which have proved most popular and instructive.

A competition was held recently for the design of a suitable emblem to be adopted for general use by the society and the prize of £1 1s. 0d. has been awarded to Mr. H. O. Ellis.

Hon. Secretary: H. LIDDLE, 69, Connaught Avenue, Mutley, Plymouth.

The Society of Ornamental Turners

The second ordinary meeting of the above society attracted twenty members and two visitors. The hon. secretary reported good progress, six new members having joined since the last meeting.

Examples of compound reciprocator work aroused considerable interest, as did a most splendid table lamp. This, the best example of polychromatic turning yet exhibited, was the work of A. J. Fowler.

The possibility of the society exhibiting at the 1951 Festival of Great Britain was discussed.

Arrangements for buying and selling surplus apparatus within the society were entrusted to Dr. C. G. Martin.

F. W. Sharpe, of Hull, was appointed editor for the half-yearly bulletin.

Hon. Secretary: F. J. HOWE, 5, Southbourne, Hayes, Bromley, Kent. Tel.: SPRing Park 4240.

The Northern Association of Model Engineers

As a result of an accident, Mr. J. A. Dean will be unable to carry out his duties as secretary of the N.A.M.E. for some time.

Until further notice, R. E. PRIESTLEY, 9, Ravensway, Bury Old Road, Prestwich, Lancs, will be acting as hon. secretary and J. H. S. Williams, of 154, Park Road, Timperley, Cheshire, is acting hon. treasurer.

At a recent meeting of the association the retiring exhibition sub-committee was re-elected to carry out the work of the 1950 show, with the exception of Mr. Denton who has moved to Peterborough and Mr. Duckitt who resigned from the sub-committee because he considered that members of it should reside near to Manchester.

Messrs. C. E. Picken and W. J. Thompson were elected to the positions vacated. Mr. Picken was also elected to N.A.M.E. council in place of Mr. Denton.